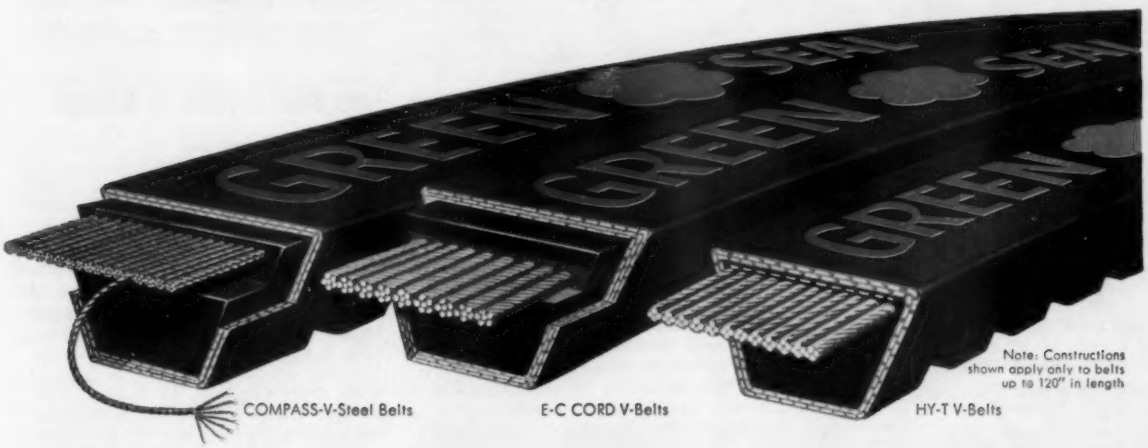
# Now—V-Belts with the Green Seal solve the major multiple drive problem




COMPASS-V-Steel Belts E-C CORD V-Belts HY-T V-Belts

Note: Constructions shown apply only to belts up to 120" in length

The Green Seal stands for true dimensional stability in V-belts. And with Green Seal dimensionally stable belts you can be sure that matched sets are truly matched and will stay matched—that mismatching (the biggest problem in belting multiple drives successfully) is a thing of the past.

The key to dimensional stability lies in the tension members of the belt. For many years, steel cables as developed by Goodyear were the only length stable load carriers, but now they have been joined by synthetic cords, thanks to the amazing Triple-Tempered 3-T process.

The 3-T process is an exclusive method of tempering the cord with Tension, Temperature and Time for maximum strength and minimum change in dimensions. This assures no change in length during storage plus greatly increased shock- and stretch-resistance on the drive.

The end result is smoother, longer-running teams of belts that give you maximum, trouble-free, horsepower hours at minimum cost. What better reason for specifying V-belts with the Green Seal?

**DIMENSIONALLY STABLE V-BELTS with the GREEN SEAL by GOODYEAR**

**THE GREATEST NAME IN RUBBER**

**The Goodyear Tire & Rubber Company, Industrial Products Division, Dept. 794, Akron 16, Ohio**

Please send me more information about how V-Belts with the Green Seal solve the major problem in belting multiple V-belt drives.

**Name**_____

**Company**_____

**Street Address**_____

**City**_____ **Zone**_____ **State**_____

Compass, E-C Cord, Hy-T, Green Seal—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

**For more facts circle 502 on Reply Card**

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# 'ROUND ABOUT with the editors in field and office

*Edited by R. L. Marinello*

## Programs on Reducing Noise

NOISE REDUCTION will be attacked from two angles at the two one-week programs to be presented at the Massachusetts Institute of Technology, Cambridge, Mass. The first week's program will cover Fundamentals of Noise Reduction; the second week, New Advances in Noise Reduction.

The first program will be presented from August 12 through August 16; the second program, from August 19 through August 23. Persons may attend either or both programs. Tuition for each program is $150.

Some of the material which will be discussed at the first week's program will be: Behavior of sound waves, Techniques for using noise measuring equipment, Acoustical materials for sound absorption, Principles of vibration isolation and Measurement of power levels and directivity patterns.

The program for the second week will cover: Case histories of noise control in office buildings, Ventilation systems quieting, Instrumentation for vibration measurement, Case histories for machine and shop quieting, and Attenuation of sound by structures, walls and barriers.

Registration information about these programs may be obtained from Dr. Leo L. Beranek, Special Summer Programs, Massachusetts Institute of Technology, Cambridge 39, Mass.

## From Plant Engineer to Manager

**Jack E. Hesse** has been appointed manager of the new Johns-Manville Transite asbestos-cement pipe plant now under construction at Denison, Texas.

He joined the Johns-Manville organization in 1938 at Marrero, Louisiana, in the plant maintenance department and was promoted to assistant plant engineer in 1942. When the company built a new Transite pipe plant at the Marrero operations in 1947 he became plant superintendent. In August, 1956, he was transferred to the production engineering department at the com-

## Plant Engineering Has Moved . . .

. . . or it will have moved when you read this notice. As we go to press with this issue we are standing knee-deep in packing crates, change-of-address cards, postal notices, and confusion. We are, after many moons, getting out of each other's hair and laps into far more spacious quarters.

So, in the future when you write to us, address the letter to PLANT ENGINEERING, 308 East James St., Barrington, Ill. Barrington is a small town 35 miles northwest of Chicago.

Because we're no longer in the heart of the Loop, don't cross us off your "People to see in Chicago" list. We will be close enough to come into town to keep appointments with friends. In fact, close enough to leave the office at 11:00 a.m. and still pick up the tab for a luncheon check.

As to telephone numbers: people located in the city of Chicago can call us on a toll-free number: NEwcastle 1-0488. Long distance calls should be made to our local phone number: Barrington 1840.

**It's almost finished. After tightening a few bolts and a little cleaning up, everything should be in readiness for the move to our new offices in Barrington, Illinois**

*Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.*

# ONE-SHOT "BOILER TREATMENT" GETS UNEXPECTED RESULTS

## CEMENT MANUFACTURER SHOOTS THE WORKS!

CLEANING rotary cement-drying kilns by firing lead slugs into them to knock off accumulations inside is routine practice. The slugs go bounding and bouncing through the long drying kiln, doing a cleaning job equivalent to a whole crew of pick-and-shovel pilots. No one expects a slug to become so enthusiastic that it continues its chores inside the waste heat boiler attached to the far end of the kiln. In fact, the odds against getting a slug into the boiler *on purpose* are astronomical. But this one got there, odds and all, thus establishing a new type of one-shot boiler treatment which is hardly likely to become popular.

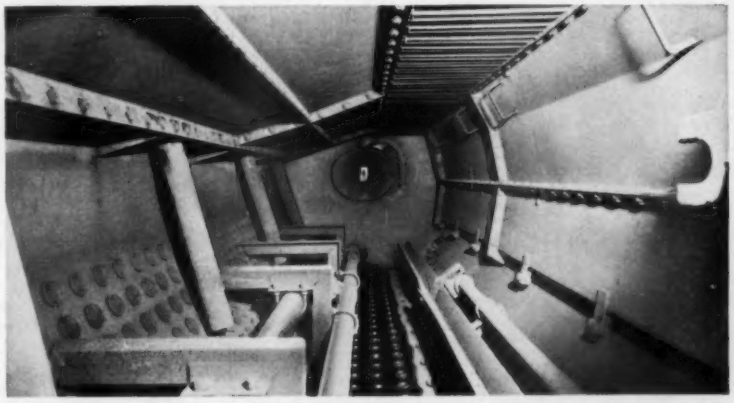
HOWEVER, *inside* the boilers at this large cement plant, Nalco System treatment helps make certain that boiler troubles, if any, are on the outside. Boiler feedwater is aerated, filtered, zeolite softened, evaporated and deaerated. A Nalco corrosion inhibitor is fed between deaerators and feed pumps for corrosion control throughout the steam and condensate return systems. Nalco catalyzed sodium sulfite does the oxygen scavenging on the discharge side of feed pumps. A Nalco internal treatment and caustic soda are fed directly into the boiler for pH control and scale prevention.

It is no wonder these boilers can turn out 169,000 lbs. of steam per hour, year after year, and stay like new—except, of course, for the wayward shotgun slug.

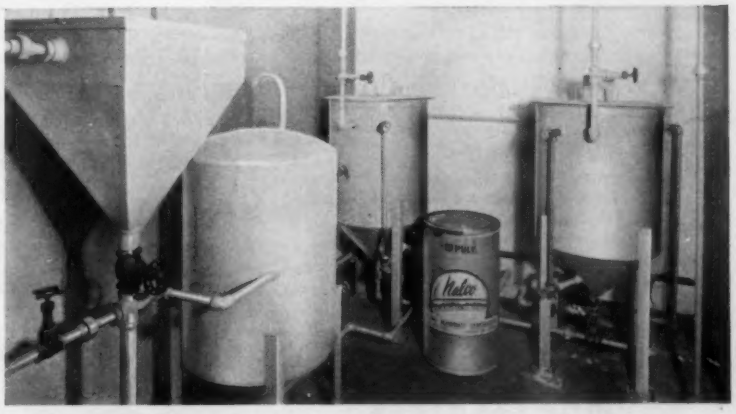
Nalco has not yet developed bullet proofing for boilers . . . But you can never tell what may come next! Meanwhile, we'll be happy to tell you more about effective Nalco Internal Treatment. Ask for Bulletin B1. National Aluminate Corporation, 6273 West 66th Place, Chicago 38, Illinois. In the Northwestern United States, Hawaii and Alaska: The Flox Company, Inc., Minneapolis, Minnesota. In Canada: Alchem Limited, Burlington, Ontario. Branches and affiliates in Spain, Germany and Italy.

**THE TREATMENT:** Lead slug, propelled by heavy powder charge in 8-gauge shell fired from a miniature cannon! "External treatment" with a vengeance.

**THE RESULTS:** "Plugged" boiler tube, pierced by lead slug on the pay off to one chance in a million. Internal treatment powerless here.



Steam drum in one of the Nalco-treated boilers at cement plant is typically clean and corrosion-free when opened for annual inspection.

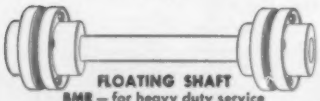



Water treatment chemical mixing and proportioning room, where Nalco System treatment starts on its way to give complete steam system protection against scale and corrosion.

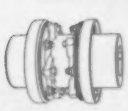
For more facts circle 503 on Reply Card

FOR MAINTENANCE FREE POWER TRANSMISSION
Specify
THOMAS
FLEXIBLE COUPLINGS

DOUBLE FLEXING
DBZ — for high speed, heavy duty drives



FLOATING SHAFT
BMR — for heavy duty service with excessive misalignment



DOUBLE FLEXING
AMR — for engine and medium speed drives

SINGLE FLEXING
SS — for engine-driven generator sets with out-board bearings

Thomas' 40 years of flexible coupling experience is at your disposal to help you meet ordinary applications or special variations for unusual cases.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

1 Freedom from Backlash Torsional Rigidity
2 Free End Float
3 Smooth Continuous Drive with Constant Rotational Velocity
4 Visual Inspection While in Operation
5 Original Balance for Life
6 No Lubrication
7 No Wearing Parts
8 No Maintenance

*Write for Engineering Catalog 51-A*

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U. S. A.

For more facts circle 504 on Reply Card

# 'ROUND ABOUT

pany's Pipe Division headquarters in New York in preparation for his present assignment.

Mr. Hesse is an authority on the production of Transite asbestos-cement pipe. He attended Louisiana State University at Baton Rouge and Tulane University, New Orleans. He specialized in mechanical and power engineering.

## Plant Engineering Changes at GM's Electro-Motive Division

**Lewis H. Steward,** recently retired from his duties as plant engineer at the Electro-Motive Division of General Motors, La Grange Illinois. **S. Allen Richards,** former assistant plant engineer, was promoted to plant engineer, and will take over Mr. Steward's duties.

Mr. Steward joined the company in 1938 to organize the maintenance department and become its first superintendent. From superintendent of the

Steward

Richards

maintenance department, he became assistant plant engineer in 1946 and, three years later, was named plant engineer.

In his post as plant engineer, which included responsibility for purchase of capital equipment, construction of all buildings, designs for building improvements as well as operation of the maintenance and utility departments, he played an important role in Electro-Motive's expansion program.

Mr. Richards, a native of Struthers, Ohio, received his B.S. degree in electrical engineering from the University of Illinois. He joined the company in 1944 as a general foreman. In 1946, he was promoted to maintenance superintendent and became assistant plant engineer on June 1, 1949, the position he held prior to his recent appointment.

## How to Measure Ballast Sound

WHEN DESIGNING a fluorescent lighting installation, this ballast sound rating calculator will help you determine beforehand if you will have a possible noise problem.

By knowing the size and acoustical characteristics of the room (this information is included with calculator), the ballast rating, the number of ballasts in the installation, and the room's ambient sound level, it is possible to find out if a sound problem exists.

The calculator, using the information for a particular installation, will indicate whether the noise problem will be annoying, audible, slightly audible, or inaudible for the particular application.

This Ballast Sound Rating Calculator can be obtained by sending one dollar to General Electric Co., Section 1662, Schenectady 5, New York.

## Scoop Attends Airco Luncheon

**J. T. Humberstone, President of Air Reduction Sales Co., New York, chats with E. B. (Scoop) Skubik, Associate Editor of Plant Engineering magazine, at a luncheon gathering during the 38th annual meeting of the American Welding Society, held in Philadelphia, Pa.**

## Isotopes for Sale

RADIOACTIVE ISOTOPES for industrial, medical, research and educational use are now available from the Nucleonic Corporation of America. These can be purchased in microcurie amounts without a license from the U. S. Atomic Energy Commission.

Complete information and prices of the various radioactive isotopes available to industry appears in Technical Bulletin 14A. It can be obtained by writing to Nucleonic Corporation of America, 196 Degraw St., Brooklyn 31, New York.

## Safety Code on Abrasive Wheels

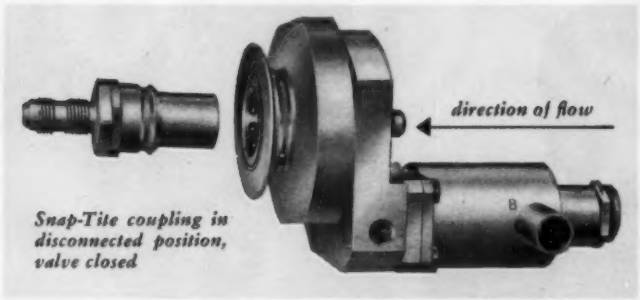
THIS NEWLY revised edition of the American Standards Association booklet "The Use, Care and Protection of Abrasive Wheels," will prove a valuable addition to your reference library.

It is presented in two-column format for easier reading. The material in the left column is confined to code regulations only. The right column offers basic reasons for each rule. Illustrative or descriptive material appears in this second column to clarify the regulation.

The booklet is divided into ten sections, as follows: scope and definition; handling, storage and inspection; general machine requirements; types of protection devices; safety guards; flanges; mounting; speed; general operating rules; and mounted wheels.

Single copies of this booklet are available free of charge from the Grinding Wheel Institute, 2130 Keith Building, Cleveland 15, Ohio.

# SNAP-TITE REMOTE CONTROL COUPLINGS FOR GUIDED MISSILES




*Snap-Tite coupling in disconnected position, valve closed*

Here is a specially designed Snap-Tite quick-connect, quick-disconnect coupling, ideal for use in missile-fueling systems. This unit is specifically designed to be manual-connected . . . can also be disconnected manually, or by use of an air-actuated remote control.

### NOT A DROP SPILLED!

When the coupling is disconnected, it spills only that small amount of fluid which clings to the metal. The valves in both the coupler and nipple automatically shut off when disconnected, *with no leakage.*

### NO AIR INCLUSION!

Coupling operation encloses only a minute amount of air.

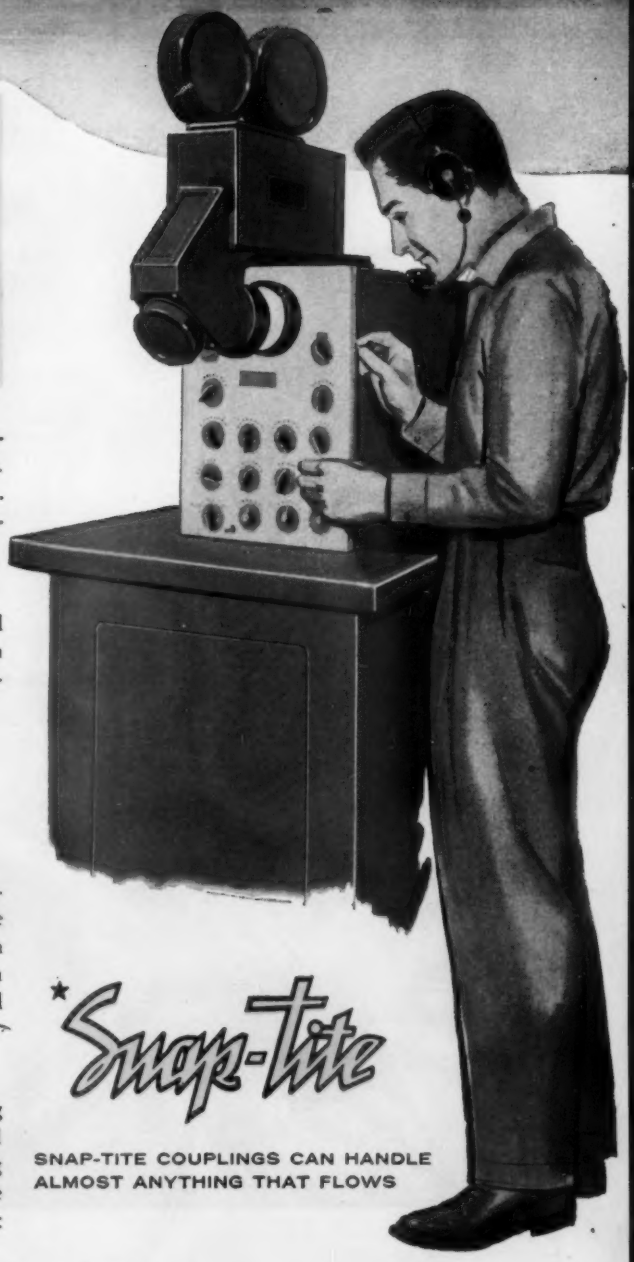
### MINIMUM PRESSURE DROP!

Smooth, streamlined passages assure maximum flow.

Variations of this coupling, to meet your required specifications, can be furnished with the appropriate seals to handle liquified gasses, exotic fuels, and a large variety of fluids with working pressures up to 3,000 PSI and temperatures from −300°F to +400°F. Units have been designed up to and including 5″ size.

### STANDARD COUPLINGS, TOO!

Your coupling needs might not be as critical as the coupling shown here, but you can be sure, when buying standard Snap-Tite couplings, that the same outstanding engineering and manufacturing skills are basic throughout the Snap-Tite line. Write for complete catalog . . . or describe your specific coupling problems. Snap-Tite, Inc., Union City 5, Pa.



★Snap-tite

SNAP-TITE COUPLINGS CAN HANDLE ALMOST ANYTHING THAT FLOWS

**For more facts circle 505 on Reply Card**

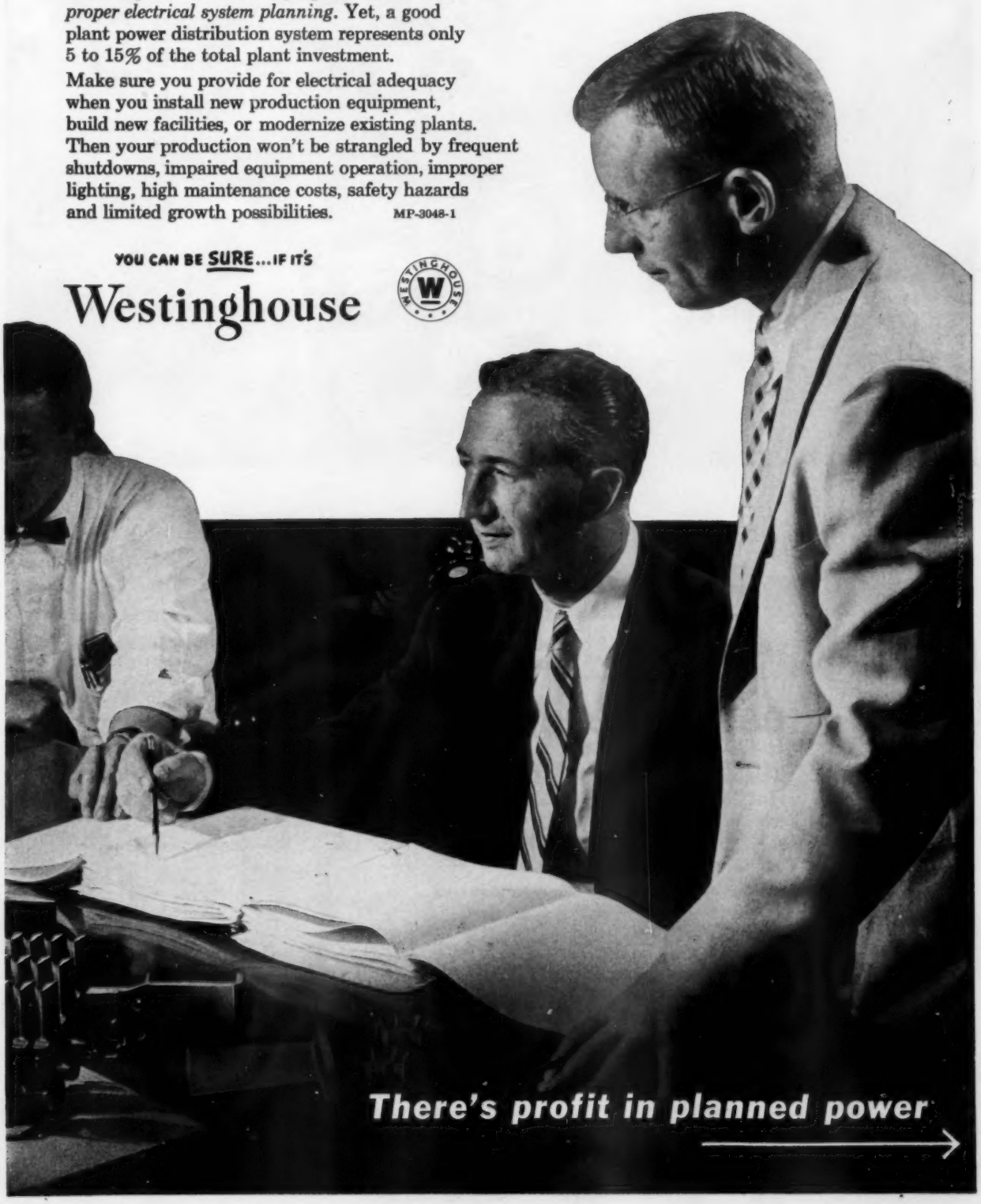
# Make sure your production isn't strangled by inadequate power!

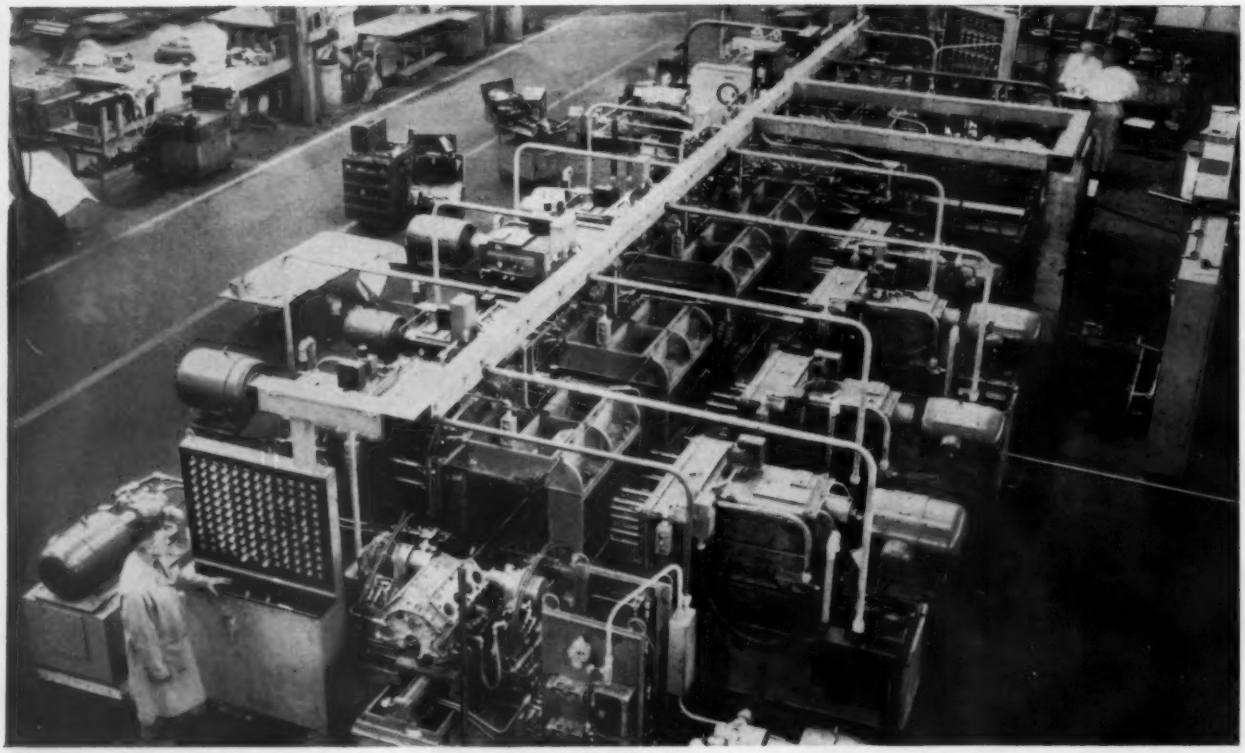
Production, marketing and financial plans are the traditional tools by which alert plant management stays competitive. Today, however, success of all three depends considerably upon a fourth factor . . . *proper electrical system planning.* Yet, a good plant power distribution system represents only 5 to 15% of the total plant investment.

Make sure you provide for electrical adequacy when you install new production equipment, build new facilities, or modernize existing plants. Then your production won't be strangled by frequent shutdowns, impaired equipment operation, improper lighting, high maintenance costs, safety hazards and limited growth possibilities. MP-3048-1

YOU CAN BE **SURE**...IF IT'S

# Westinghouse





*POWER-UP* ***with Westinghouse:***

# make your production system more dependable, economical . . . keep it flexible, expansible

When you POWER-UP with Westinghouse, production gains in scope. Continuous power supply, coupled with constant voltage, brings new reliability to production. Provision for load growth and built-in flexibility means you're prepared electrically for years to come. Years, incidentally, that will see use of electricity in-increase about 8% per year. A modern distribution system also brings new advantages in convenient arrangements and easy maintenance.

Let Westinghouse help you get adequate plant power with economy and safety through proper system design and voltage, increased transformer and circuit capacities, higher interrupting capacity. There's profit in planned power—particularly if it's Westinghouse.

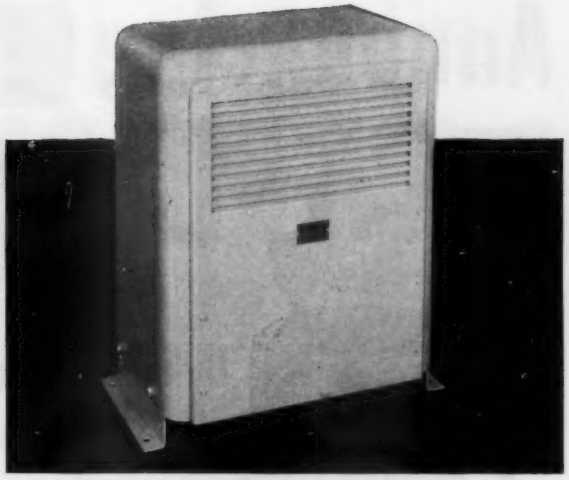
**Characteristics of Distribution Systems**

| TYPE OF SYSTEM | Flexibility | Service Continuity | Regulation | Efficiency | Operation and Maintenance Cost | Initial Investment |
|---|---|---|---|---|---|---|
| Modern Simple Radial | F | F | D | C | A | A |
| Primary-Selective Radial | D | D | D | B | A | B |
| Simple Network | A | A | A | C | B | E |
| Simple Spot Network | C | A | A | D | D | E |
| Primary-Selective Network | A | A | B | A | C | D |
| LEGEND | A . . . 91-100%<br>B . . . 81-90% | | C . . . 71-80%<br>D . . . 61-70% | | E . . . 51-60%<br>F . . . 41-50% | |

Approximate relative standing of five basic distribution systems. For detailed analysis of your system, consult your Westinghouse salesman. MP-3048-2

**YOU CAN BE SURE...IF IT'S Westinghouse**

Westinghouse dry-type power centers eliminate fire hazard. Location close to load shortens secondaries, cuts line losses, improves regulation. They're 25-40% lighter than liquid filled . . . easily mounted overhead to save production space.



New Westinghouse 3-phase dry-type transformers fit easily into convenient, close-to-load points. Smaller (25-51%), lighter (17-32%), quieter (12-13 db below NEMA standard). Low case temperatures. Save 36% in installation costs.

Westinghouse low-voltage, metal-enclosed switchgear has high interrupting capacity for dependable operating continuity and safety. Unitized design reduces costs, provides custom installation for your needs.

Westinghouse capacitors, used with inductive equipment, permit more of your system's capacity to carry working current. You get improved power factor, lower costs, more capacity for new loads.

New design Westinghouse control centers simplify layout, installation, service, future growth. They make possible a compact, centralized control system . . . assuring coordinated motor control and greater savings.

Coordinated design of Westinghouse AB De-ion® circuit breaker-type panelboards (right) assures positive protection to lighting and heavy power circuits. An accurate thermal-magnetic action allows full time delay on overloads, but trips instantly on short circuits.

For more facts circle 506 on Reply Card

# Announcing 2 new complete 1 HOLL-O-RAMS

## Dynamic new multi-purpose 20, 30 and 60-ton power packages for production, maintenance, construction—for all industry!

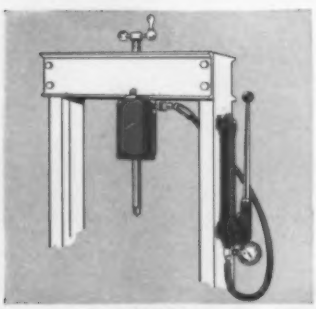
**Amazing HOLL-O-RAMS**

Three basic 20, 30 and 60-ton HOLL-O-RAMS apply controlled force. Unique hollow center simplifies setups . . . brings new ease, speed, power to 1001 jobs.

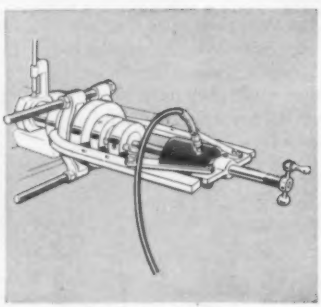
**UNIVERSAL SADDLES**

HOLL-O-RAM employs 3 separate saddles. *Smooth hollow saddle* (standard) for straight-through pulling; *threaded hollow saddle* to take adjusting screw for pressing, pulling and pushing applications requiring adjustability; and *serrated solid saddle*, which converts HOLL-O-RAM to a remote-controlled jack!

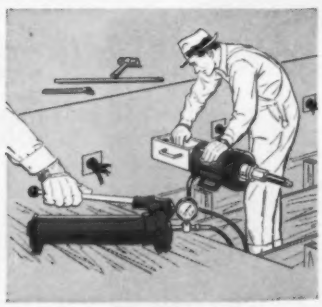
## NEW HOLL-O-RAMS unfold vast new horizons of applications in . . . PRODUCTION — MAINTENANCE — CONSTRUCTION



Pressing



Maintenance pulling



Pre-stressing

***Phone your industrial supply man right now!*** *He'll give you quick facts on HOLL-O-RAMS and HYDRAULIC PULLERS — leave you a complete Blackhawk Catalog No. HP-400.*

# Blackhawk hydraulic tool lines

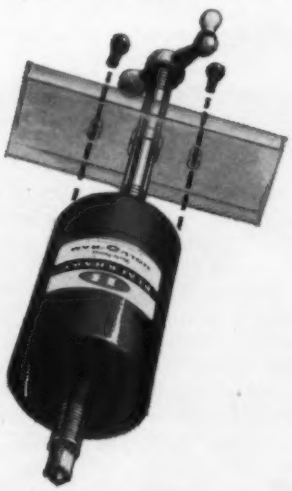
# 2 HYDRAULIC PULLERS

Now, revolutionary Blackhawk HOLL-O-RAMS and HYDRAULIC PULLER LINES — built by the world's largest manufacturer of hydraulic power tools — are *far beyond* the scope of any hydraulic tools on the market today!

Sensational Blackhawk HOLL-O-RAM design harnesses hydraulic force for *straight-through* pulling or direct pushing. Hollow center design — quick, easy exchange of 3 different saddles, adjusting and mounting attachments — all keys to HOLL-O-RAM's *unmatched versatility*.

**VERSATILE MOUNTING AND ADJUSTING ATTACHMENTS**

Permits top or bottom mounting of any HOLL-O-RAM. Easily adapted for pulling attachments, jig or fixture work, presses, production run operations. Infinitely adjustable . . . makes *full use* of plunger power stroke!

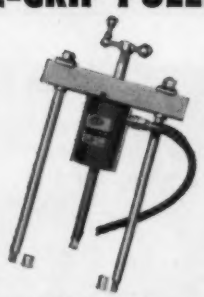


**POWER HOUSE FOR NEW COMPLETE LINE OF BLACKHAWK PULLERS**

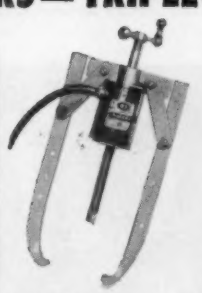
A maintenance man's dream! Powers a full line of Blackhawk pullers to meet every situation. One ram design fulfills the requirements of HOLL-O-RAM uses and serves as a versatile power unit for Hydraulic Pullers — a Blackhawk exclusive!

## NEW- 3 COMPLETE SERIES OF HYDRAULIC PULLERS: PUSH-PULLERS — DOUBLE-GRIP PULLERS — TRIPLE-GRIP PULLERS

NEW Blackhawk hydraulic puller line activated by 20, 30 and 60-ton HOLL-O-RAMS. Out go time-wasting mechanical and ordinary hydraulic pulling methods! Smooth Blackhawk hydraulic pullers will not gall shafts, wander, slip off! It's the quick, safe, easy-to-operate and torque-free method of removing or installing gears, pulleys, wheels, bearings — any shaft-driven part press-fit to tube or shaft! (Low-cost Blackhawk Converter Sets available to convert your present mechanical or shop-made pullers to easy-going hydraulic pullers!)



**PUSH-PULLERS** in 3 capacities. No galled shafts— no hammering or prying.



**DOUBLE-GRIP PULLERS** in 3 capacities. Grips tighter as load increases.

**TRIPLE-GRIP PULLERS** in 3 capacities. Non-distorting, friction-free pulling.

# BLACKHAWK

"World's Largest Manufacturer of HYDRAULIC TOOLS"

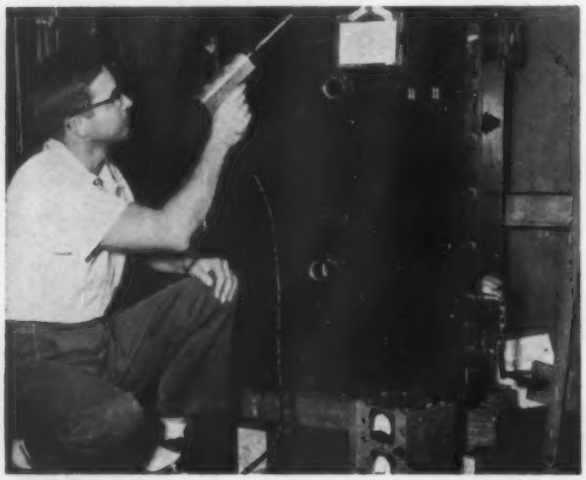
**BLACKHAWK MFG. CO., DEPT. H-4977, MILWAUKEE 46, WISCONSIN**

**For more facts circle 507 on Reply Card**

SAVINGS | LEAK DETECTION

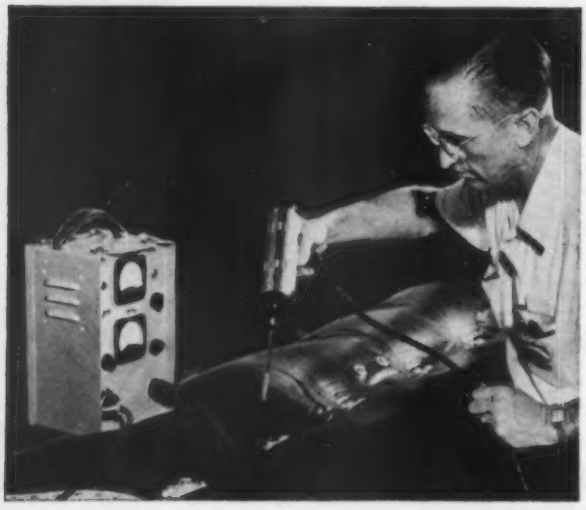
## Detection Cuts Costs 85%

Whenever leaks can be expensive in terms of money, safety, efficiency or reputation, there is a General Electric Leak Detector designed with your applications in mind. Three General Electric detectors, the Type H-1, the Fixed-head Detector, and the Type M-2 Mass Spectrometer Detector, are available. All are currently in use throughout industry. For example, the Novi Equipment Company, Novi, Michigan, cut service repairs costs 85% on auto air conditioning units after adopting the Type H-1 Leak Detector as a standard item in repair kits. Novi Equipment Company has equipped each of its factory installation centers with G-E detectors.



## Testing Facility in Field

The compactness, portability and rapid response time of the General Electric Type H-1 Leak Detector have given the Georgia Power Company an on-the-spot method of determining leaks in the sealing of network protectors. Performance reports from this utility indicate an appreciable reduction in testing time and costs. As long as 110-volt a-c current is available, you can reduce your testing time and costs by using the General Electric Halogen Leak Detector (Type H-1) for testing all your field equipment. The Type H-1 detector will locate leaks in any system which contains a halogen compound, or into which such a compound may be introduced as a tracer gas. The detector body contains an element that is extremely sensitive to halogen vapors. A suction fan in the body of the detector pulls a continuous air sample through the sensitive element.



## Cells Economically Tested

Another application of the Type H-1 Leak Detector is shown by North American Aviation Company where the General Electric detector is a reliable aid in assuring leak-proof fuel cells. At North American, each cell is inflated with a mixture of air and carbon tetrachloride. The cells are then given a thorough, careful inspection with the G-E detector. The G-E detector weighs only 24½ pounds, is easily carried along the assembly line. In addition, the G-E detector is extremely sensitive, requiring only the minimum testing time. The accuracy and quality of the Type H-1 detector's test are demonstrated by the fact that only a spoonful of the tracer is required to test the entire cell!

*Progress Is Our Most Important Product*

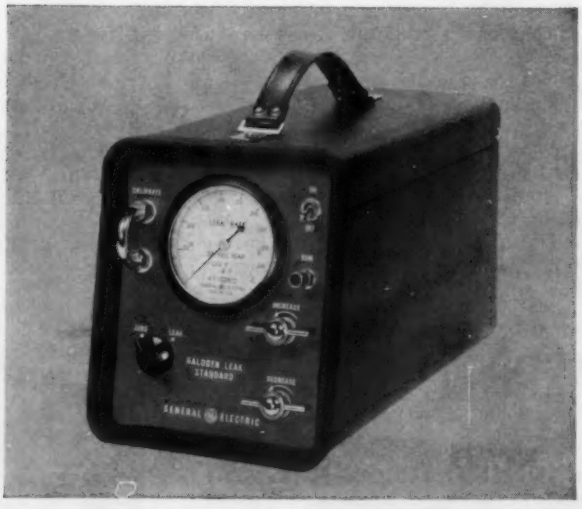
GENERAL ELECTRIC

## Pressurized Cans Tested

Another General Electric detector designed with cost savings specifically in mind is the Fixed-head Leak Detector. Continuous production line testing of pressurized cans is now possible with this new detector. Intended for use by manufacturers of insecticides, hair lacquers, paints, plastic sprays, shave lathers, shampoos, etc., the new unit accurately leak-checks every can on the line. This 100% leak test helps protect product quality throughout its shelf life, and complaints and returns caused by deterioration on dealers' shelves can be sizably reduced. This new method is more sensitive, less expensive, and faster than conventional "hot water" methods. It eliminates manual testing of cans and enables you to initiate automatic rejection of faulty cans. Operation of the detector requires no special skill, little employee training.

## Ultimate in Leak Sensitivity

The third General Electric leak detector, the Type M-2 Mass Spectrometer Leak Detector, is designed for leak-testing vacuum systems or pressure systems. The Type M-2 detector will locate leaks as small as $1 \times 10^{-10}$ standard cubic centimeters of air per second, a leak rate so small that more than 5000 years would elapse before one cubic inch of air at atmospheric pressure would leak into an evacuated vessel. Manufacturers of components for atomic energy equipment, refrigeration and air conditioning systems, and electronic devices—industrial tubes, semiconductors, and hermetically sealed components depend on this extreme sensitivity to assure meeting specification requirements. Rugged industrial construction, simplicity of design, and use of plug-in type components make the General Electric device easy to operate and maintain.




## Quantitative Leak Measurement

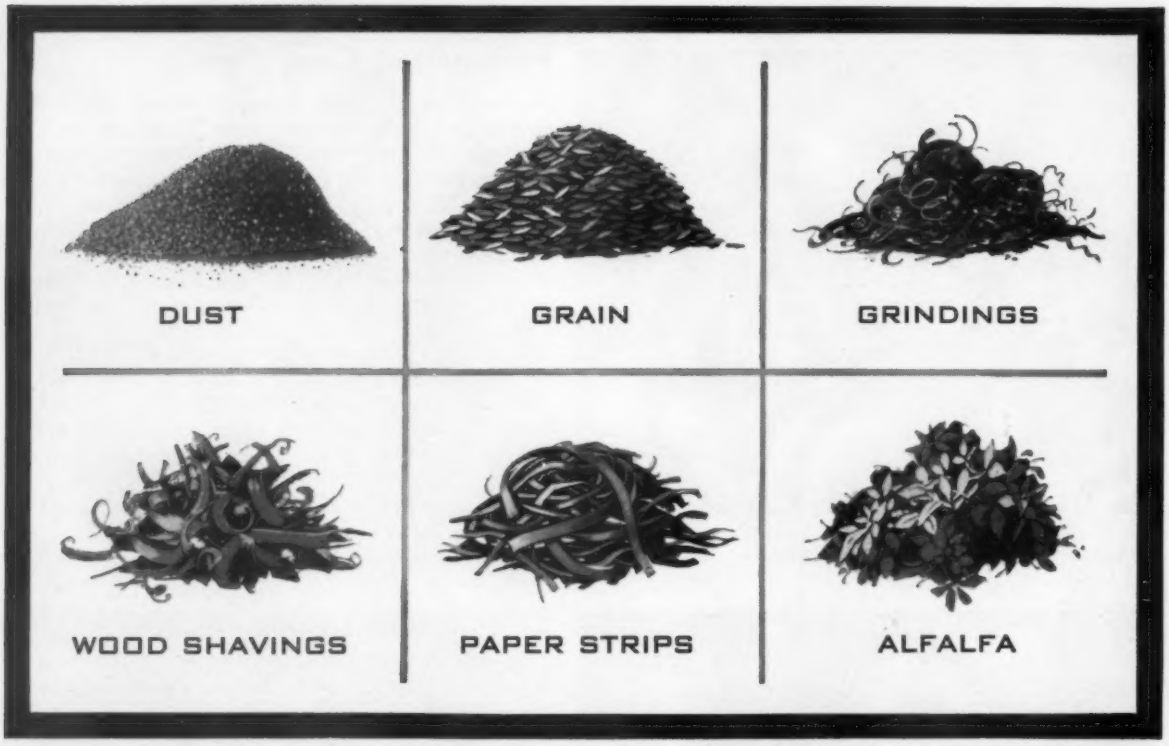
Accurate determination of leak size is now possible by calibrating the H-1 Leak Detector with this new standard. Once maximum quality control leak limits have been established they are accurately maintained by using the Leak Standard as a dependable reference. Portable, ruggedly constructed, and adjustable, this instrument enables you to maintain a new high in control of leak measurements. For further information on G-E's Leak Detection equipment call your General Electric Apparatus Sales Office or write Section 585-42, General Electric Company, Schenectady 5, New York. *Remember, accurate leak detection means profits.*

*Progress Is Our Most Important Product*

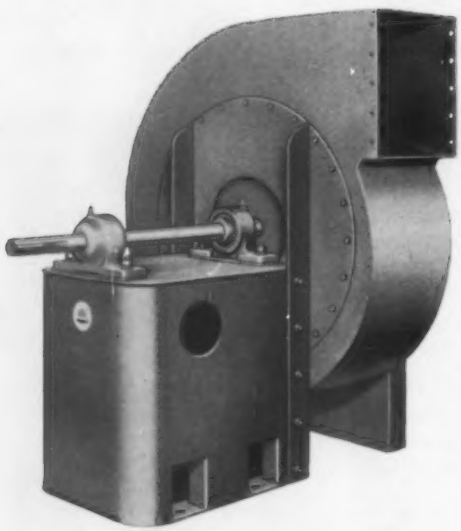
GENERAL ELECTRIC



For more facts circle 508 on Reply Card




# American Blower Industrial Fans take large or small particles right in stride!



Lick tough process applications with the versatile American Blower Industrial Fan.

**The secret is their versatility.** You see, the American Blower Industrial Fan is available with three types of wheels: Type AH for air handling, Type MH for material handling, Type LS for long shavings.

And there's a wide range of fan arrangements, optional constructions—for severe duties or high-temperature operation—and optional accessories to allow fan modification to suit an individual job.

What's more, it's available as a packaged fan—that is, a self-contained unit with its own motor, drive and weather-proof hood enclosure. This eliminates the need for a separate motor foundation, and the complications of motor lineup, belt centers and weather protection.

If you have a process application involving air, gas, or material handling, why not consider our industrial fan? Your nearest American Blower branch-office man is the one to call. His intimate knowledge of the special problems of many industries—and his complete product line—is at your disposal.

American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products.

**AMERICAN BLOWER**

Division of American-Standard



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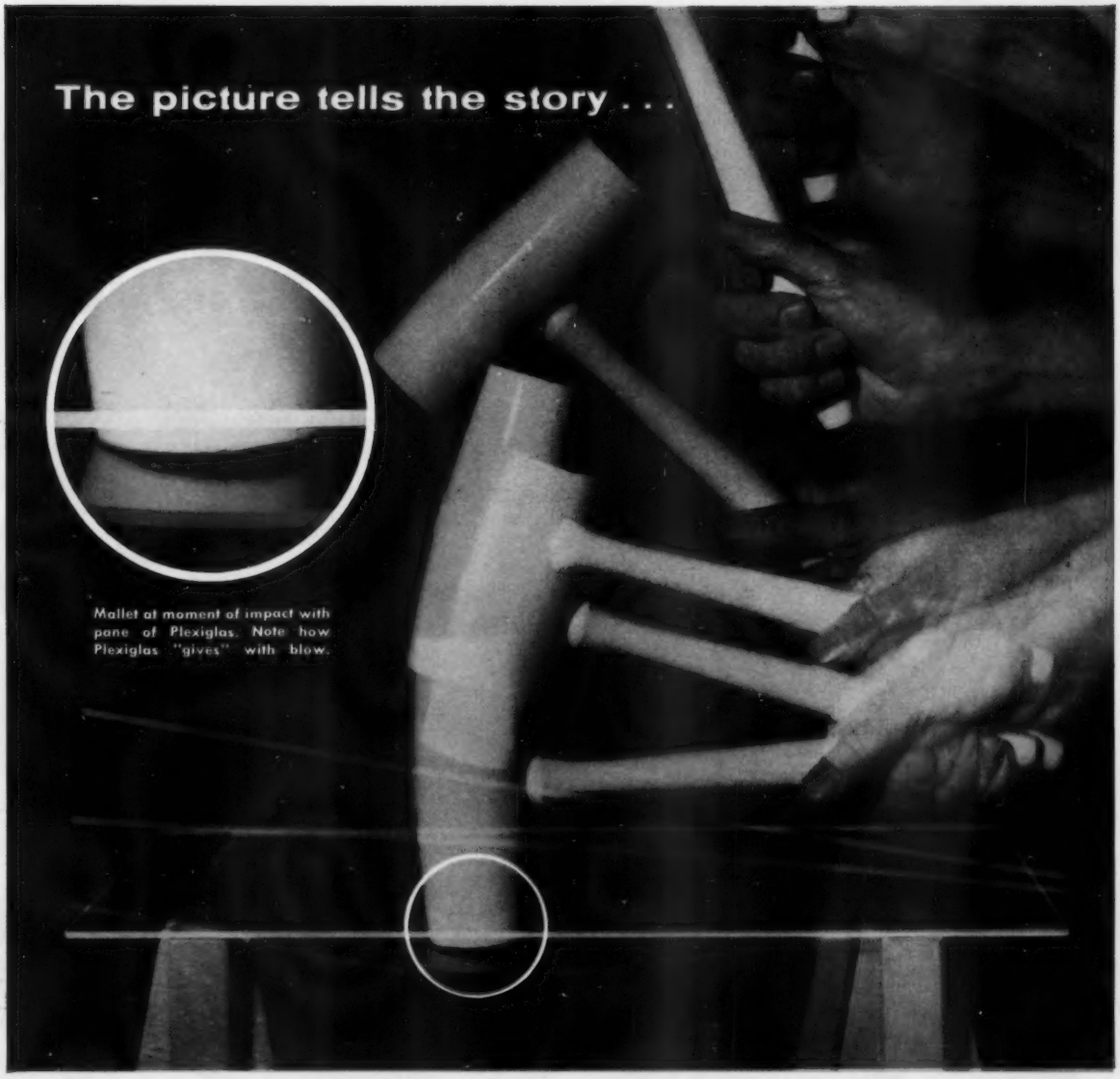



# why **Plexiglas** is used for window glazing

Crystal clear PLEXIGLAS® acrylic plastic is as easy to see through as a hole in the wall. But what makes it so desirable as a glazing material is its stout resistance to breakage. A hard blow tends to flex it rather than break it. And it won't shatter.

PLEXIGLAS is also weather-resistant, light in weight, easy to handle (no sharp edges), easy to install, rarely requires replacement.

For information, sizes, prices and quick delivery call your dealer. He's under "PLEXIGLAS" in the plastics section of most classified telephone directories. Ask him about PLEXIGLAS R—the lower-cost grade that is especially suitable for industrial glazing.

*Chemicals for Industry*

**ROHM & HAAS COMPANY**

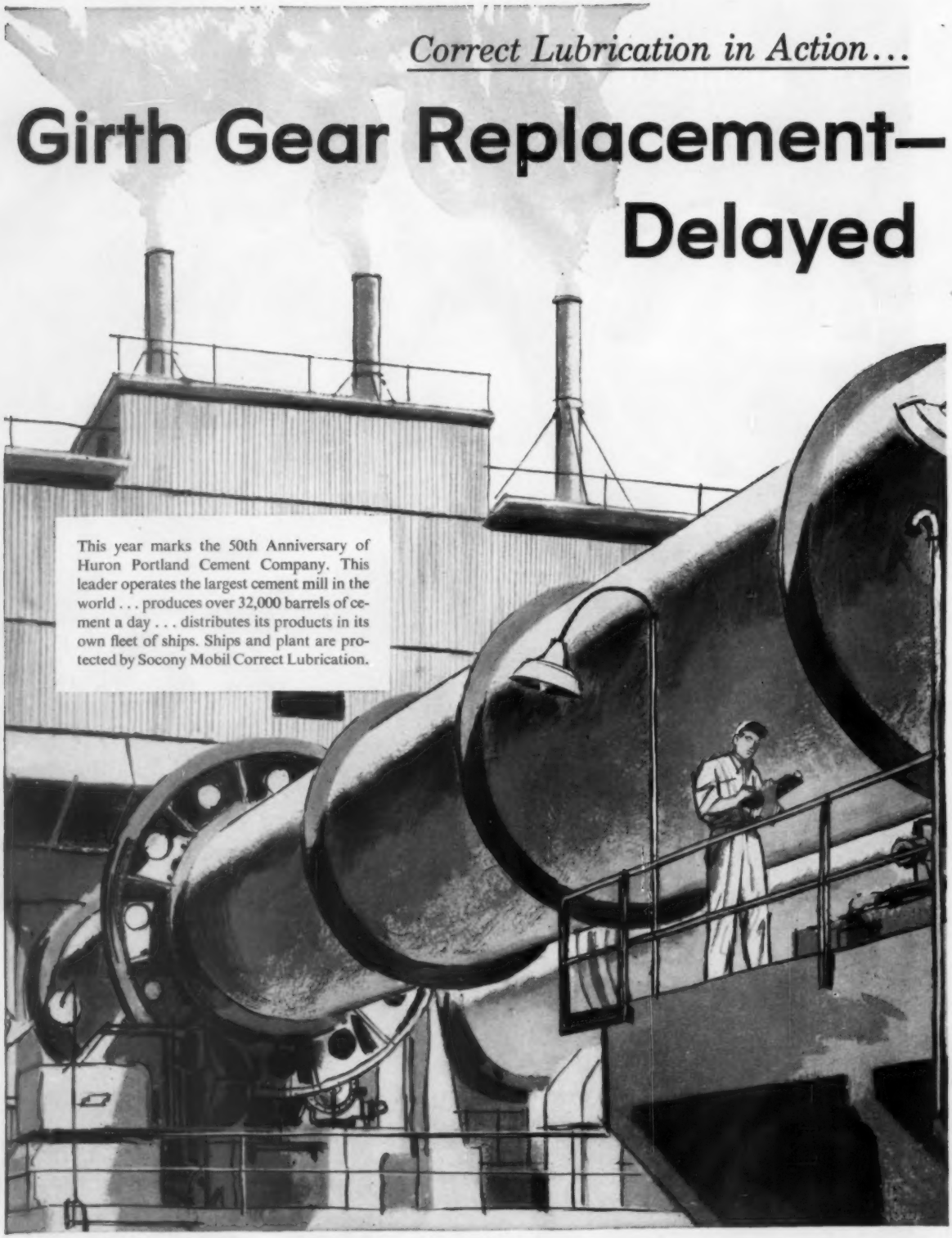
**WASHINGTON SQUARE, PHILADELPHIA 5, PA.**

*Representatives in principal foreign countries*

**Canadian Distributor:** *Crystal Glass & Plastics, Ltd., 130 Queen's Quay East, Toronto, Ontario, Canada.*

*Correct Lubrication in Action...*

# Girth Gear Replacement— Delayed



This year marks the 50th Anniversary of Huron Portland Cement Company. This leader operates the largest cement mill in the world . . . produces over 32,000 barrels of cement a day . . . distributes its products in its own fleet of ships. Ships and plant are protected by Socony Mobil Correct Lubrication.

Mobil **SOCONY MOBIL**

*Leader in Lubrication for over 91 years*

*in the* **Cement Industry**

# Expenditure of $8,800 Indefinitely !

**One of many maintenance savings made by the Huron Portland Cement Company with the help of Socony Mobil**

Located at Alpena, Michigan, is the world's largest single cement plant. To assure its continuous operation at minimum maintenance cost, Huron Portland Cement Company relies on a Socony Mobil Program of Correct Lubrication. Here's an example of this comprehensive service in action:

*Problem:* Pinion gears on four kilns were wearing excessively . . . so also were the huge girth gears. In time, girth-gear teeth became so roughened that new pinion gears would be quickly damaged when installed. How to avoid the costly job of replacing the girth gears was the problem facing the Company.

*Solution:* After consultation with Huron Portland personnel, Mobil engineers recommended a special Mobil lubricant compound that cut wear on pinion gears . . . at the same time helped smooth up the girth-gear teeth. Result—girth-gear life was extended indefinitely . . . $8,800 saved on just one kiln.

Service like this has helped this cement company continually improve profits through increased production . . . reduced maintenance costs. Perhaps it can do the same for your plant.

**Other ways Mobil Correct Lubrication cut costs**

*Exceptionally long product life*—4 Allis-Chalmers generators supply power for entire Huron Portland Cement plant. Same fill of Mobil D.T.E. oil has been in continuous use in one of these generators for over ten years. Units have not shut down once due to lubrication failure. In fact, latest samples show oil to be in "like new" condition . . . good for many more years.

*Gear maintenance cost cut*—Mobil engineers surveyed planetary-type gear sets that drive mills, kilns and other machinery. As a result, they recommended a single wide-range lubricant in place of three products formerly used. Qualities of this Mobil product eliminated periodic need to clean sludge from gear cases . . . extended oil fill life 100% . . . produced savings in storage and handling.

*Engineering assistance cut downtime*—Mobil engineers cooperated with Huron Portland in investigating cause of bearing and tooth failures on gear reducers. It was found that gears had been purchased from different suppliers and that tooth sizes varied. Mobil suggested purchasing new gears from one supplier. Mobil engineers also suggested that grooving in pressure area of split-bushing bearings be removed. When this was done, gear reducer trouble ceased . . . downtime was sharply cut.

*Complete Mobil service*—Supplying Huron Portland with top-quality lubricants is only a part of the comprehensive Mobil program. Mobil field personnel, engineers and sales representatives work closely with Huron Portland's maintenance personnel. They conduct in-plant training courses, make analyses of products in use, submit periodic reports on benefits achieved. No wonder records show a continual reduction in maintenance costs over the years.

*Correct Lubrication*

**A proved program to reduce maintenance costs**

SOCONY MOBIL OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP., MOBIL OVERSEAS OIL CO., INC.

This dramatic illustration is an actual example of the fact that minimum centers for EXTREMULTUS belts are *limited only in that pulleys should not touch!*

But – the exceptional friction characteristics that make this drive possible *are not enough!*

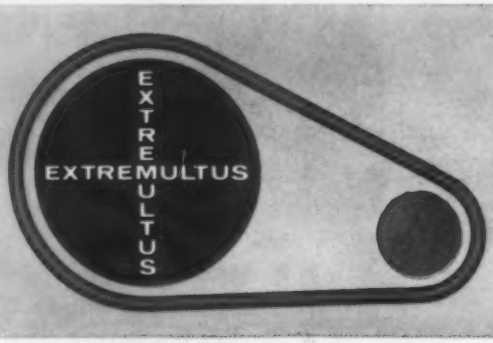
Notice the absence of outboard bearings. EXTREMULTUS will always reduce bearing loads *to less than those imposed by other belts!*

Notice the extremely thin, narrow belt made possible by the highly flexible, incredibly strong polymer that is EXTREMULTUS' tension core. In other applications, EXTREMULTUS runs *over 10,000 feet per minute!*

Notice the absence of idlers. EXTREMULTUS will run for years on fixed centers *without stretch, without "take ups," without adjustment!*

Send us your *worst* belt problem today for a quotation on an *engineered*, guaranteed drive.

# EXTREMULTUS BELTS ELIMINATE CENTER DISTANCE PROBLEMS




EXTREMULTUS, INC.
405 Lexington Ave., New York 17, N. Y.

Please rush full information on EXTREMULTUS for use on

.....

Name.....

Title.....

Company.....

Street.....

City..... State.....

For more facts circle 512 on Reply Card

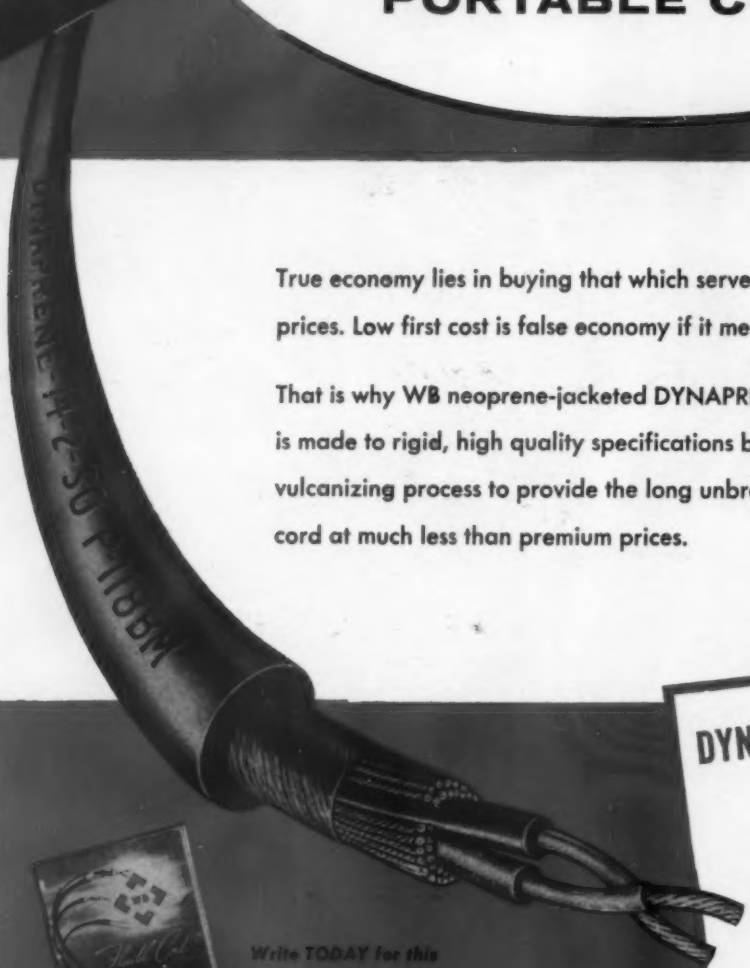
25 Horsepower Briquette Press 10" motor pulley driving 48" Flywheel at 30" Center Distance and 104° Arc of Contact. This machine makes one briquette from sawdust or planer shavings every 0.3 seconds.

How You SAVE MONEY With...

WHITNEY BLAKE

# DYNAPRENE®

PORTABLE CORD




True economy lies in buying that which serves you best at reasonable prices. Low first cost is false economy if it means frequent replacements.

That is why WB neoprene-jacketed DYNAPRENE is a money saver. It is made to rigid, high quality specifications by the continuous vulcanizing process to provide the long unbroken service of premium cord at much less than premium prices.

*Write TODAY for this complete catalog . . . no charge, of course.*

DYNAPRENE FEATURES

- HIGH FLEXIBILITY
- LONG FLEX LIFE
- STRONG—TOUGH
- STANDS UP UNDER SHOP CONDITIONS
- FLAME RESISTANCE

Well Built Wires Since 1899

© 1957

WHITNEY BLAKE COMPANY

NEW HAVEN 14, CONNECTICUT

**For more facts circle 513 on Reply Card**

# BULLETINS just released and of immediate plant interest

Reader Service Cards for ordering bulletins are on pages 213-214. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

## MECHANICAL POWER TRANSMISSION

**101** **Variable Speed Drives**—Catalog VSD-11, 8 pp, gives complete data for the selection of drives designed to accommodate company's Q, R and W cross-section variable speed cog belts. Drive selection tables giving a wide selection of speed ratios, driven speed ranges and center distances for motors up through 20 hp are included. The Dayton Rubber Co.

**102** **What's In a V-Belt?**—Informative little 16-pp Booklet S-51105 describes raw materials used in producing V-belts. Natural and synthetic rubbers, cotton and synthetic cords, rubber chemicals and steel cables used in company's line are subjects for explanations of each material's role in the final product. Goodyear Tire & Rubber Co.

**103** **Variable Speed Belts**—Eight-pp Bulletin 1640-B1 P gives features of the Worthington-Goodyear variable speed belts, listing sizes and providing an interchange list showing number of the belt corresponding with other manufacturers' belts. Key to number coding for V-belt identification is provided. Worthington Corp.

**104** **Parallel-Shaft Gearmotors**—Bulletin 60-2 is a 24-pp booklet covering company's expanded line of parallel shaft gearmotors in built-in and motor-coupled types. Profusely illustrated, bulletin provides full descriptions and specifications for units from ½ to 60 hp. Load capacity and torque tables are included, also drawings illustrating standard mounting positions. Electra Motors Inc.

**105** **Transmission Equipment**—Included in 12-pp Form TD-119 on power transmission equipment for motive and other applications are illustrations of company's synchronized transmission series, new StepMatic transmissions, TransVerters and torque converters from 11 to 26 in. in size. Cutaway photos of Model 265V transmission and Model 17BK torque converter are included in booklet, which also describes torque rating speeds, weight and synchronization. Transmission Div., Clark Equipment Co.

## ELECTRICAL

**106** **Electric Motors Care**—Based on two recently released colored slide films, Bulletins 51X8581 and 51X8582 are entitled "How to Make a Motor Go . . . and Go, and Go, and Go," and "How to Take Step Seven." Both bulletins graphically tell the story of correct electric motor inspection and maintenance. Allis-Chalmers Mfg. Co.

**107** **FHP Motors**—Bulletin GEA-6424, 16 pp, illustrates design advantages and shows components in integrated insulation system of general purpose fhp motors used in equipment manufacturing field on such applications as power tools, heating and ventilating equipment, compressors, fans, water pumps, and machine tools. Illustrated in full color. General Electric Co.

**108** **Part Winding Starters**—Bulletin GEA-6606 discusses advantages of two-thirds part-winding starting. Gives application data, connection diagrams, part-winding characteristics of a typical motor, nomenclature and price information on the CR7050 part-winding starter for either one-half or two-thirds part winding of standard motors or part-winding motors for motors for reduced kva inrush. General Electric Co.

**109** **Heavy Duty Relays**—Complete information about company's line of IMP (interchangeable multiple pole) and FMP (fixed multiple pole) heavy duty relays is contained in this 8-pp bulletin. Diagrams and dimensional drawings, photos, and specifications included. The Arrow-Hart & Hegeman Electric Co.

**110** **Data on Relays**—Technical information on magnetically held and mechanically held relays is presented in 42-pp Catalog 57-S4. Covers applications, ratings, specifications, design and mounting information, and includes wiring diagrams and outline dimensions, as well as illustrative detail. Automatic Switch Co.

**111** **Motor Control Center**—Bulletin GEA-6367A, 24 pp, describes a compactly designed general-purpose motor control center which permits savings up to 50 per cent in floor area. Construction and application are detailed and ratings, dimensions, installation data and guide form specifications listed. General Electric Co.

**112** **On Control Centers**—This 16-pp manual contains descriptive and pictorial information on manufacturer's line of control centers. Special attention is given to planning the control center by means of a step-by-step "do it yourself" guide to writing the specification for a control center to fit plant. Square D Co.

**113** **High Frequency Transformers**—Bulletin P257H, 28 pp, offers features, ratings and complete data on company's standard line of variable transformers for high frequency applications. Gives full information on 35 types of miniaturized manual and motor-driven transformers for 28, 120, 240 and 480-v, single and three phase service in ratings from 56 va to 8.7 kva. Outline dimensions included. The Superior Electric Co.

**115** **Battery, Power Connectors**—Catalog GB6, 32 pp, contains information on battery connectors, power connectors, and heavy duty connectors for industrial and allied applications. A variety of applications are illustrated and described and photos and dimensional diagrams of recepticals included. Cannon Electric Co.

## PUMPS, COMPRESSORS

**116** **Industrial Pumps**—A number of different types of industrial pumps for a variety of applications are illustrated and described in this pamphlet. Size and capacity data are listed for each type in the line. C. H. Wheeler Mfg. Co.

**117** **Screw Pump**—Six-pp Bulletin S-206 describes basic construction and design of a line of standard screw pumps, double external bearing and gear type, and double external bearing and gear hopper type. Features are illustrated through cutaway views and approximate dimensions are tabulated. Warren Pumps, Inc.

**118** **Submersible Pumps**—Bulletin B254B describes company's deep well submersible pumps designed to operate inside the well completely submerged in water. Features and advantages are detailed and a selection chart is included. Sumo Pumps Inc.

**119** **Vertical Service Pumps**—Six-pp Bulletin SCP describes company's short coupled vertical service pumps. It explains the many uses of service pumps, including suggested installation plans, existing installations for oil refineries, pipe lines. Layne & Bowler, Inc.

**120** **Flow Control**—Twelve-pp Catalog 800 describes four basic models of precision proportioning pumps for uses requiring accurate and positive proportioning of flow in range of 0 to 730 gph. Materials of construction, capacities and pressures are shown. Diaphragm valves are discussed and their features noted. A section on plastic valves and diaphragms features valves for temperatures to 300 F, and includes material chart covering diaphragm selection for use with air, water, corrosives, slurries, liquids and gases. Hills-McCanna Co.

**121** **Plastic Pumps**—The versatility of service which plastics offer to designers of heavy duty pumps is pointed out in a bulletin entitled "Tough Pumps For Tough Jobs." A table listing characteristics of selected plastics is included. Vanton Pump & Equipment Corp.

**122** **Air For Industry**—Bulletin M-81, is a 44-pp engineering catalog on company's M-line industrial air compressors. Gives capacities, specifications and typical data for air requirements from 200 to 2000 hp. Generously illustrated with photos, cutaways and sketches, this book discusses design features, major components, automatic control, lubrication system, motors and drives. Four models are presented in detail, along with space plans and dimensions. The Cooper-Bessemer Corp.

**123** **Diesel-Engine Compressors**—Integrally-built diesel-engine compressors are shown in 8-pp Form 3207. The unit featured combines a four-cycle V-angle heavy duty diesel engine and the slow speed horizontal compressor on a single crankshaft without use of coupling mechanism. Advantages are stressed and design features illustrated. Ingersoll-Rand Co.

## SEALS

**124** **Feed Pump Seals**—Detailed information on mechanical seals and sealing systems for boiler feed pumps, also other hot water pumps, is contained in Form S-230. Gives information on economies obtained as well as technical and installation data. Seals and systems described are engineered to the operation, including adaptation to pump design and piping arrangement. Crane Packing Co.

**125** **Oil Seals**—Catalog 856-C, 68 pp, lists oil seals carried in stock with accompanying stock numbers and C/R part numbers. Prefacing the listings is a section on materials available for use as sealing members, including Sirvis leather, Sirvis-Conpor, (elastomer impregnated) leather which permits self-lubrication without leakage, and Sirvene (synthetic rubber) compounds. Engineering section covers shaft material, finish, hardness, shaft size and tolerance, shaft speeds, eccentricity, pressure and lubrication. Installation procedure and diagrams included. Chicago Rawhide Mfg. Co.

## VALVES, PIPING, FITTINGS

**127** **Semi-Steel Valves**—Bulletin V-203 Rev. 1, 44 pp, covers company's entire semi-steel valve line. A revised edition, it includes new features, including two pages of photos, drawings and detailed description of lubricants and lubricating methods, and cutaway photos showing working parts of 4 types of semi-steel valves —two-bolt cover, screwed-gland, bolted-gland, and multiport types. Specifications included. Meter and Valve Div., Rockwell Mfg. Co.

**128** **Control Valves**—Condensed Catalog 57 describes pressure and temperature regulators; solenoid, diaphragm, motorized and float valves; pressure reducing, flow control, safety and relief valves; strainers. Photos of individual models and specifications are included. O. C. Keckley Co.

**129** **Relief, Back Pressure Valves**—Bulletin 357 describes company's chemical relief valves and back pressure valves. Gives complete specifications including capacities of 4 standard sizes—¼, ½, ¾ and 1 in. Dimensions and materials of construction are also detailed. Milton Roy Co.

**130** **Control Valves**—Twelve-pp Bulletin 571, containing more than 30 illustrations, shows Quick-As-Wink air and hydraulic control valves including sliding sleeve, single plunger, O-type, B-type and high pressure hydraulic valves. Describes construction and operation of each valve and intended service. Valve and hose couplings shown. C. B. Hunt & Son, Inc.

**131** **Pipe, Tubing, Fittings**—Plant engineers concerned with equipment involving use of tubing and piping at high temperatures will be interested in Bulletins 145A and 152A. The former discusses company's Croloy 2¼ and the latter, Croloy 1¼. Both present technical data on analysis, mechanical and physical properties, fabrication, heat treatment and maximum allowable working pressures for various applications at different metal temperatures. Tubular Products Div., The Babcock & Wilcox Co.

**132** **PVC Pipe, Fittings**—Bulletin PE-40, 12 pp, describes physical properties and chemical resistance of company's PVC pipe and

# BULLETINS

(Begins on page 21)

fittings designed for process industries. Plumbing and installation data is included, as well as pipe and fitting dimensions, valve dimensions, and information on Pyrex brand process equipment. Corning Glass Works.

**133 On Plastic Pipe** — Containing latest technical information on pressure-rated plastic pipe and fittings, this 8-pp booklet includes complete tables on pressure drop through plastic pipe, pressure-temperature ratings for different sizes, and recommended pumping depths. Figures are given on three grades of polyethylene pipe: standard wall, 75-lb and 100-lb. Booklet provides pictures of plastic pipe installations and explains procedure. Companion polystyrene fittings are also covered. Crane Co.

**134 Pipe Fabrication**—"How Piping is Fabricated" is the title of this 16-pp bulletin, which illustrates equipment, materials and processes, including pipe bending facilities, welders, x-ray machines, heat-treating furnaces, pipe and fittings inventories and other facilities for accurate, quality piping fabrication. The Flori Pipe Co.

**135 Pipe and Tubing Manual**—Products from ⅛ to 40 in. OD are described in this 48-pp book. Full color photos show company's production and quality control procedures and the story of company's Contour Trentweld is told briefly. Separate sections deal with pipe and tubing for use in high pressure applications, beverage and dairy equipment, mechanical equipment and others. Also shown is large diameter tubing for pulp mill stock lines, waste disposal systems in chemical industries, exhaust stacks etc. A section is devoted to titanium tubing. Tables show sizes. Trent Tube Co.

**136 Tubing Tolerances**—Covered on this convenient data chart are tolerances for both seamless and welded mechanical tubing, and seamless and welded stainless steel tubing and pipe. Explains tolerances in detail and gives permissible variations in OD and ID, wall, ovality and straightness. Peter A. Frasse & Co.

**137 Control Manifolds** — Eight-pp Catalog 956 describes the original ¾ and 1 in. manifold, and the new ½ in. size recently added to the line. Components are fully detailed, as well as applications and other data, and installation dimensions are diagrammed. Republic Mfg. Co.

**138 Welding Outlets**—Couplets—easily installed, branch connections for tanks, pressure vessels and pipelines—are described in Bulletin CP-1-57. Provides complete dimensional and specification data on screw-end and socket-welding types and on a 90-deg elbow Couplet. Installation details are included. W-S Fittings Div., H. K. Porter Co., Inc.

## INSULATION

**139 Pipe Insulation** — Specifications for Mono-Kover, a slit, one-piece, sectional type mineral wool pipe insulation that snaps into place, are presented in this bulletin. Besides describing insulation properties, bulletin explains and illustrates application methods. Thermal conductivity is shown. Available facings are listed, and tables give recommended thicknesses for pipe sizes from ¾ to 24 in., according to temperature, application. Baldwin-Hill Co.

**140 Insulation Specifications**—This set of six specifications covers application of Foamglas insulation for industrial equipment and piping. Each booklet contains tables of suggested thicknesses, detailed drawings of installation procedure, insulation supports and recommended finishes. Booklets cover: low temp equipment and piping (below 70 F); medium temp equipment and piping (70 to 212 F); high temp equipment and piping (over 212 F); dual temp equipment and piping (—300 to 400 F); underground piping; and insulation on spheres. Pittsburgh Corning Corp.

## MAINTENANCE

**141 Concrete Floor Paint**—Uses of Harcol Redi-Mixed, a non-metallic dry mix for hardening and coloring interior and exterior concrete floor toppings, are outlined in this illustrated brochure. It contains color chips of the product, as well as application information. L. Sonneborn Sons, Inc.

**142 Epoxy Paints**—The added properties of epoxy paints when modified with liquid polymers are illustrated and described in this 8-pp bulletin. It contains a sample metal strip sprayed with an epoxy liquid polymer to illustrate resistance to chemicals and water, impact resistance and enamel-like finish. Thiokol Chemical Corp.

**143 Zinc Coating**—This bulletin describes a special zinc coating applied as a paint to provide galvanic protection to metals. A variety of applications are fully detailed. Subox, Inc.

**144 Metallic Epoxy Putty**—Bulletin 11 describes the A2 series of aluminum-filled epoxy resin compounds designed for use in metalworking and other industries and for any repair or maintenance activity requiring a chemically-stable, non-shrinking and nonflammable putty with good adhesion to iron, steel, aluminum, wood, glass or ceramics. Smooth-On Mfg. Co.

**145 Water Repellent Coating** — Properties and advantages of Hydrocide S-X Colorless, a water repellent coating for masonry, are described in this informative bulletin. Performance results of laboratory tests are detailed to show water repellency. L. Sonneborn Sons, Inc.

**146 Solving Roof Problems** — Those concerned with roof maintenance will find the current edition of "Solving Roof Problems" an informative 16-pp brochure. Illustrated with photos, drawings and diagrams, it explores such subjects as types of roofs, how they are built, what factors enter into their deterioration, how roof troubles can be diagnosed and treated. The Tremco Mfg. Co.

## SAFETY

**147 ABC of Fire Protection**—Nature and advantages of fire protection systems are discussed in 36-pp Bulletin 66. Explains insurance savings and other economic benefits afforded by fire protection. Systems and components are described and pictured. Applications and functions of different types of systems are charted. Bulletin covers fixed-temperature, rate-of-temperature-rise, alarm and control systems. Methods utilized include water sprinklers, water fog, air foam, chemical foam, dry chemicals and carbon dioxide. Automatic Sprinkler Corp. of America.

**148 Automatic Fire Detection**—This 12-pp brochure describes a rate-of-temperature-rise fire detector, outlining its operation on a pneumatic principle. It is designed to trigger an alarm at the first unusual rise of temperature in a protected space. According to booklet, these systems are equipped with a reserve 80-hr battery. Walter Kidde & Co., Inc.

**149 Hazard Finder**—To locate hidden probabilities of electrically ignited explosions in plants, this "Hazard Finder" is offered. An 8-pp folder, it contains a check list of 13 questions that can help determine whether uncontrolled flammable gases, vapors, dusts, liquids and other combustible materials are making a plant unsafe. An evaluation of hazard potential is thus revealed Crouse, Hinds Co.

## MATERIALS HANDLING

**151 Engineered Systems**—Catalog 67A, 16 pp, describes a number of engineered and automated handling systems and is illustrated with photos and diagrams. Materials handling equipment for bulk and unit materials, automated and special handling machinery and foundry equipment are also illustrated, and company's creative engineering service described. Planet Corp.

**152 Handling Equipment Guide**—This 14-pp bulletin describes design and construction features of company's line of materials handling equipment, including a hydraulically controlled portable power belt conveyor, a power belt conveyor designed to put power in gravity flow systems where they must carry to higher elevations, and a floor-to-floor belt conveyor. Photos and diagrams of the equipment are included, as well as complete specifications. Speedways Conveyors, Inc.

**153 Conveyor Systems**—This planning folder contains latest information about company's low-cost power and free overhead conveyor systems. Included is a planning grid plus an explanatory diagram of one of the systems, which will permit quick determination of overhead conveyor system needs. Chainveyor Corp.

**154 Power and Free Conveyors**—To assist plant engineers concerned with efficient mechanical handling of materials, this 16-pp brochure describes 10 major materials handling functions that invite the use of power and free conveyor systems. Applications described and diagrammed include dispatching materials automatically, storing and banking materials, providing different load spacings and speeds for various production operations, and handling indexing operations, recirculating loads. Jervis B. Webb Co.

**155 For Bulk Materials**—Latest information on equipment for storing and handling bulk materials is contained in 12-pp Bulletin 574. Descriptions, specifications and dimensions of vertical and horizontal tanks are included. Cost savings afforded by bulk storage and handling facilities are noted. Pneumatic conveying systems, material handling accessories and custom fabricating are discussed. Typical tank installations are illustrated. The Day Co.

**156 Hand Lift Trucks**—Mechanical and hydraulic hand lift trucks are discussed in this interesting 16-pp booklet. Tells what they are, how they operate, how to select and how to use them. Stresses role of hand trucks in materials handling and lists their advantages. Generously illustrated with photos and sketches, booklet also gives information on skids and pallets. Association of Lift Truck and Portable Elevator Manufacturers.

**157 Powered Materials Handling**—A complete line of fork-lift trucks, straddle carriers, powered hand trucks and towing tractors is described in this 16-pp catalog. Specifications given for each model include capacity, turning radius, width, length, fork length, lift heights and service weight, as well as other data. Gas-, electric-, and diesel-powered models are treated. Clark Equipment Co.

**158 Industrial Trucks**—Manufacturer's full line of trucks is described in 12-pp Bulletin 57. Attachments available are also covered. Trucks include gasoline and LPG fork lifts in 1000- to 7000-lb capacities, electric fork trucks to 15,000-lb capacity, electric platform trucks to 10,000-lb capacity and electric crane trucks to 10,000-lb capacity. Also described is a side-loading fork lift truck in electric and internal-combustion engine models. Data on construction features and tables of specifications are provided. Baker-Raulang Co.

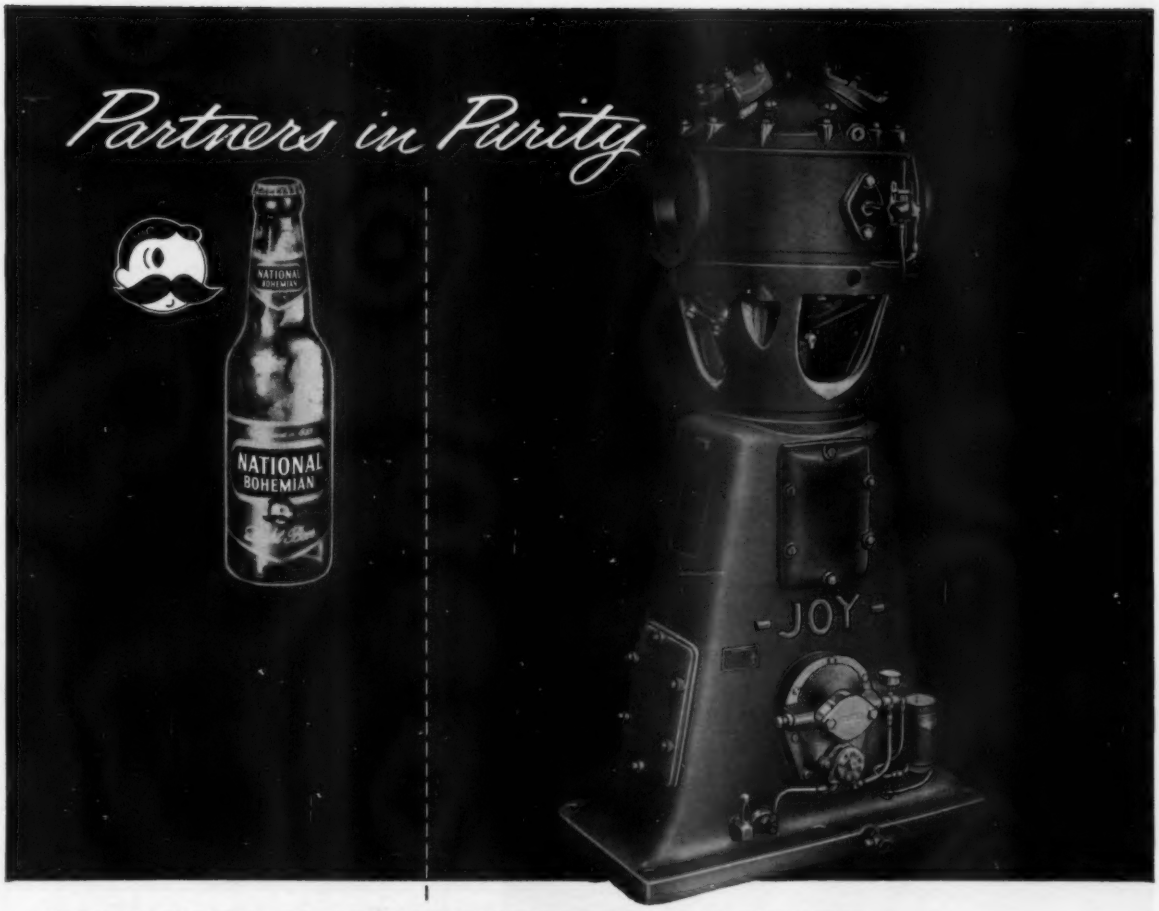
Reader Service Cards for ordering bulletins are on pages 213-214. Be sure to include your name, job title, and company even if you want bulletins mailed to your home address.

**159 Gas-Powered Truck** — This 6-pp brochure describes design, operation and advantages of a gas-powered 3000-lb capacity fork truck. Drawings and photos illustrate design and operation features, and graphs and sketches indicate grade and drawbar pull, turning radius and upright dimensions. Industrial Truck Div., Clark Equipment Co.

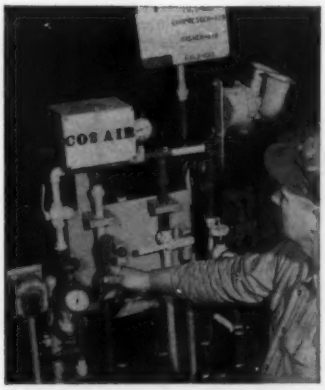
**160 Diesel Tractor**—Bulletin MS-1192 is a fold-out specification sheet covering company's HD-16 diesel-powered crawler tractor. Features a cutaway view of the tractor showing both gear-type and hydraulic torque converter drive transmissions, as well as mechanical, design and construction details. Construction Machinery Div., Allis-Chalmers Mfg. Co.

**161 Casters and Wheels**—Catalog C-57, 12 pp, illustrated with photos and cutaway sections, features descriptions and full specifications on company's industrial casters and wheels. Advantages of construction and design are shown and described. The Fairbanks Co.

**(More Bulletins on page 215)**




## JOY OIL-FREE COMPRESSORS HELP GUARD QUALITY OF NATIONAL BOHEMIAN BEER




*Oil-free compressed air is used for other operations in the "National-Bob" plant.*

The National Brewing Company, Baltimore, Md., uses oil-free compressed air to regulate an important phase of their processing. Temperature control during pasteurizing is a critical point in the brewing of fine beer. Recording instruments control the steam inlet on preheat and precool tanks. The compressed air that operates these instruments must be free of oil and water or they plug up and record incorrectly.

**National Brewing hasn't had a bit of trouble** with this operation since they installed their first Joy Oil-Free Compressor. These compressors use carbon piston rings that require no lubrication. No oil in the cylinder—no oil in the compressed air.

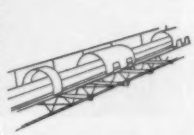
Is National Brewing happy? They placed a second Joy unit in operation a year later. Find out more about Joy oil-free compressors . . . write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company, (Canada) Limited, Galt, Ontario.*

**JOY** . . . EQUIPMENT FOR INDUSTRIAL PLANTS . . . FOR ALL INDUSTRY

NEED OIL-FREE AIR . . . WRITE FOR FREE BULLETIN 167-15.

WSW 1 6984-167

INDUSTRIAL COMPRESSORS



CONVEYORS

ELECTRICAL CONNECTORS

FANS AND BLOWERS

# Only New HALLOWELL *ERECTOMATIC.* Steel Shelving

**LESS TIME, MORE UNITS PER HOUR,** lower costs with Hallowell ERECTOMATIC steel shelving. Maximum adaptability to meet changing conditions, too.

No matter what type of shelving you need—open, closed, bin units, ledge units, counter or cabinets —there's new Hallowell ERECTOMATIC® steel shelving to make your job easy. The unique built-in locking device* speeds assembly and rearrangement of shelving. To position a shelf—just slide it into place on the shelf supports, press the locks, and the shelf is locked. To reposition a shelf—release the locks, pull the shelf straight out, slide it straight in on its supports at the new location, and press the locks. It takes only seconds to do the complete job.

For complete information, see your Hallowell distributor. Or write Hallowell Shop Equipment Division, STANDARD PRESSED STEEL CO., Jenkintown 26, Pa.

*Patent applied for

**TWO MEN ASSEMBLED** new Hallowell ERECTOMATIC steel shelving in just over 10 minutes. Closed unit was 36 in. wide, 18 in. deep, 7 ft. 3 in. high, complete with seven shelves. Standard models of other design required from 13-55 min. Table shows test results.

| Brand | Time to Assemble (Min.) | Units Per Hour |
|---|---|---|
| Erectomatic | 10.24 | 5.75 |
| A | 13.23 | 4.53 |
| B | 14.24 | 4.21 |
| C | 16.30 | 3.68 |
| D | 18.12 | 3.31 |
| E | 25.03 | 2.40 |
| F | 55.03 | 1.09 |

**FAST ASSEMBLY.** Just position the shelf supports, insert the shelf, and press the unique locking device. No tools or special instructions necessary.

# gives you all these extra-value features

**QUICK SHELF CHANGE.** Just release the locks, remove the shelf and its supports, relocate the shelf, and press the locks. It takes only seconds.

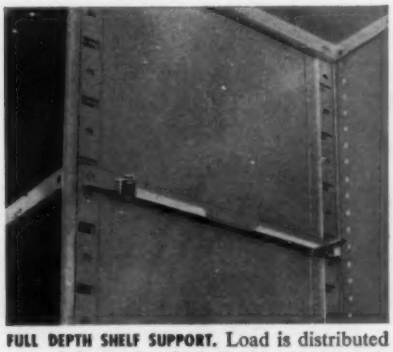
**STRAIGHT-IN, STRAIGHT-OUT SHELF CHANGE.** No tilting to interfere with any other shelf. No time wasted unloading shelves or removing bin fronts, partial dividers, label holders.

**INDEPENDENT SHELF POSITIONING.** Each shelf is an independent unit. Can be removed and repositioned without disturbing any other part. All shelves in a rack can be aligned.

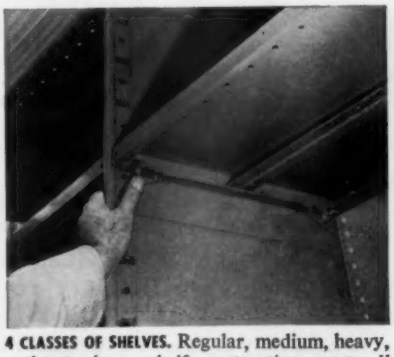
**FULL USE OF SHELF AREA.** No angles or tees, and beaded corner posts prevent waste of valuable storage space. No box guides are needed.

**COMMON SIDE PANELS AND POSTS** save assembly time. Also save material between adjacent units in a rack. And both back and side panels are one-piece.

**BEADED POSTS AND FLANGED SHELVES** prevent snagging of clothing or stored goods. Also prevent injuries from sharp, ragged edges.



**FULL DEPTH SHELF SUPPORT.** Load is distributed over full depth of shelf. No buckling is possible. Reinforcements can be added when they are required.



**4 CLASSES OF SHELVES.** Regular, medium, heavy, and extra-heavy shelf construction meets all load requirements. Made to government specifications. Extra-heavy shelf shown.

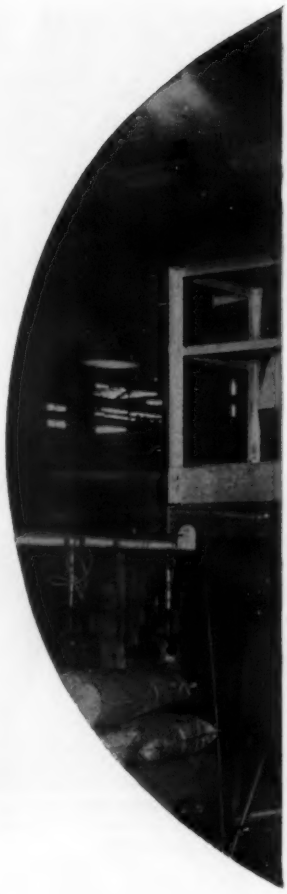
STANDARD PRESSED STEEL CO.

HALLOWELL SHOP EQUIPMENT DIVISION SPS

JENKINTOWN PENNSYLVANIA

For more facts circle 515 on Reply Card

# "Our Turbo Air Blowers were often shutdown by motor starting currents . . . *until we changed to Fusetron Fuses*"



"As our Turbo air blowers build up speed there is a back up pressure exerted which puts an overload on the motors. Consequently, it takes longer for the motors to gain normal running speed.

"Frequently, the 100 ampere renewable fuses we were using couldn't hold these overloads—and we would have a shutdown.

"We were anxious to eliminate these down-periods, but we didn't want to sacrifice safe fuse protection on our 30 h. p., 3600 R. P. M., 220 volt, 3 phase, 60 cycle motors that power the Turbo air blowers.

"We decided to protect these motors with 100 ampere Fusetron dual-element fuses. This move proved to be the answer to our problem. Since changing to Fusetron fuses we haven't had any trouble with our Turbo air blowers being 'knocked out' on motor starting currents."

*B. D. McGaughey*
ELECTRICAL SUPERINTENDENT,
*Copperweld Steel Company, Glassport, Pa.*

## HERE'S HOW FUSETRON FUSES PROTECT AGAINST NEEDLESS BLOWS CAUSED BY HARMLESS OVERLOADS.

Fusetron dual-element fuses will hold motor-starting currents or other harmless overloads without opening because they have a tremendous time-lag.

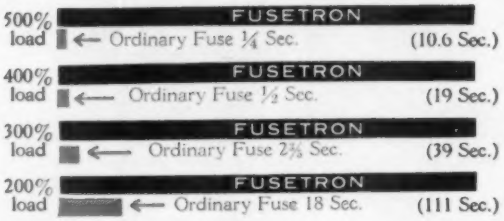
A machine may momentarily stall or be overloaded and Fusetron fuses won't open.

A motor may be started under heavy load—or all the motors on a circuit may be started at once—and Fusetron fuses won't open.

Circuits can be loaded nearer to the capacity of panelboards and switches without having Fusetron fuses open needlessly.

**Here's a comparison of time-lag between Fusetron and ordinary fuses**

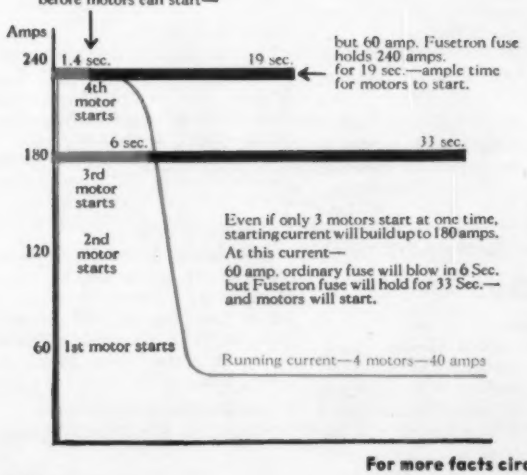
Notice that even at 500% load a Fusetron fuse will hold on for more than 10 seconds—while an ordinary fuse will open in less than ¼ second. Yet, with all this time-lag, there is no sacrifice of safety.




Comparison is based on ordinary fuses with the longest time-lag. Figures apply to 30 amp. 250 volt size. Opening time on larger sizes and on 600 volt sizes is longer.

**Here's an example of how Fusetron fuse time-lag works**

For example: take four 10 amp. motors on a circuit. 60 amp. ordinary fuses would be used to protect the circuit. BUT see what happens when four motors start at one time. The starting current of each motor is about 60 amps. so the combined starting currents would reach 240 amps.


At this load—
60 amp. ordinary fuse blows in 1-4/10 Sec. before motors can start—
Amps
240
1.4 sec.
19 sec.
but 60 amp. Fusetron fuse holds 240 amps. for 19 sec.—ample time for motors to start.
4th motor starts
6 sec.
33 sec.
180
3rd motor starts
Even if only 3 motors start at one time, starting current will build up to 180 amps.
At this current—
60 amp. ordinary fuse will blow in 6 Sec. but Fusetron fuse will hold for 33 Sec.— and motors will start.
120
2nd motor starts
60
1st motor starts
Running current—4 motors—40 amps

So with Fusetron fuses installed in Mains, Feeders and all Branch circuits—shutdowns caused by needless blowing of fuses are ENTIRELY WIPED OUT.

**Don't risk losses!** One needless shutdown . . . one lost motor . . . one destroyed switch or panel . . . one burned out solenoid . . . may cost you far more than replacing every ordinary fuse with Fusetron dual-element fuses. Write for bulletin FIS.

**For loads above 600 amps.— Use BUSS Hi-Cap Fuses to coordinate your electrical circuits.**

On 600 volts or less, BUSS Hi-Cap fuses have an interrupting capacity sufficient to handle any fault current regardless of system growth.

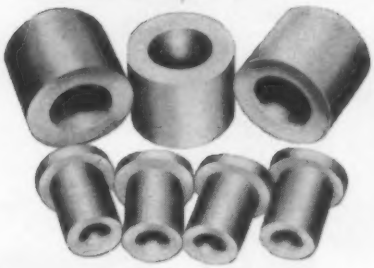
They can be coordinated with Fusetron fuses on feeder and branch circuits to limit fault outages to circuits of origin. Write for bulletin HCS.

**Bussmann Mfg. Division** *(McGraw-Edison Co.)*
University at Jefferson, St. Louis 7, Mo.

***Play safe!*** *install Fusetron dual-element fuses and BUSS Hi-Cap Fuses throughout entire Electrical System!*

**For more facts circle 516 on Reply Card**

Chempro
FM-4
COMBINES TEFLON GLASS GRAPHITE INERT LUBRICANTS
into an
INERT HARD FRICTIONLESS BEARING MATERIAL



Chempro's new Style FM-4 bearings, bushings, washers, etc., have given remarkable service in pumps, mixers and reactors operating under highly corrosive conditions. Style FM-4 bearings and bushings are hard, corrosive-resistant, have a low coefficient of friction, and compare favorably in wearability with those made of metal.

*Write for Bulletin CP554.*

THE ORIGINAL FABRICATORS OF TEFLON* PACKINGS AND GASKETS

*duPont Trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N. Y.

For more facts circle 517 on Reply Card

# BACKTALK AND FORETHOUGHTS

*Edited by Marjorie E. Weissman*

## Ventilation Manual Reprints

PLANT ENGINEERING:

"We would appreciate receiving two copies of your reprint of the eight-page manual on Industrial Ventilation, published in the February, 1957 issue of PLANT ENGINEERING.

"The 'Manual for Modern Plant Ventilation Practice,' by K. E. Robinson of the General Motors Research Staff, will be very helpful to us in future ventilation problems." *H. L. Young, Mechanical Engineer, A. P. Green Fire Brick Co., Mexico, Mo.*

PLANT ENGINEERING:

"We are very much interested in an article entitled 'Industrial Ventilation' by K. E. Robinson, Ventilation Engineer, General Motors Corp., which appeared in February, 1957, in PLANT ENGINEERING.

"Would you kindly advise us how we may obtain 12 reprints of this informative article for our training program at Lederle." *E. V. Neuser, Maintenance Dept., Lederle Laboratories Div., American Cyanamid Co., Pearl River, N. Y.*

▶ Many of our readers have found this manual of considerable interest—reprints are still available to those who would like extra copies.—*Editors.*

## Hot-Spray Painting Query

PLANT ENGINEERING:

"We read with interest in your April, 1957 issue of PLANT ENGINEERING an article by Mr. Leroy Hutzler III, Medium Transformer Department, General Electric Co., on 'Hot Paint Spray' comparisons.

"We have been using hot spray methods for some time and would like to check further into the methods of heating the paint. Mr. Hutzler touched briefly on this part of the hot spray system, but he did not elaborate.

"Would it be possible to obtain more information on this from Mr. Hutzler or through your magazine?" *H. S. Tamaki, Asst. to Works Manager, Dominion Bridge Co., Ltd., Toronto, Ontario, Canada.*

▶ Readers who would like more information on using hot spray methods should write directly to the author, at Medium Transformer Dept., General Electric Co., Rome, Ga. We are quite sure that he would be glad to answer any specific questions from our readers.—*Editors.*

## No Wall-Size Charts

PLANT ENGINEERING:

"Thank you for sending us your 'Quick and Accurate Pipe Sizing Charts' which we noted in the October, 1953 and April 1957 issues of PLANT ENGINEERING. However, in our first letter to you we requested these charts in the wall size. We still wish to obtain these charts in this size and would appreciate having them sent to us.

"If the latest edition of these charts is not yet available in the wall size, we would appreciate being put on the mailing list so that we might receive them as soon as they are published." *Jeanne M. Keogh, Librarian, Libbey-Owens-Ford Glass Co., Toledo, Ohio.*

▶ We suggest that readers interested in using the piping charts as wall charts, arrange locally to have them enlarged, as we will not be reprinting them for this purpose.—*Editors.*

## Coping with Industrial Noise

PLANT ENGINEERING:

"In PLANT ENGINEERING, March, 1957 issue, on page 93, there appears an article on noise reduction, by D. R. Brown and C. L. Coyne, Engineers of Western Electric Co. of Chicago, Ill.

"Would you kindly send us three reprints of the above article?" *Richard C. Fricke, Process Engineer, Shakeproof Div., Illinois Tool Works, Elgin, Ill.*

PLANT ENGINEERING:

"We would like an abstract of one of your editorials that is of much interest to us. The subject is 'How To Control Industrial Noise' and was written by Dr. Howard C. Hardy.

"We are at present working on a soundproof testing room for the Canadian General Electric Co., Ltd. If you have any literature or information on the above subject, we would be sincerely grateful." *Ken J. Code, Len Ariss and Co., Ltd., Guelph, Ont.*

▶ Tear sheets of the articles and others from our past issues have been sent to these readers with the compliments of the editorial department.—*Editors.*

## Tearsheet Roundup

PLANT ENGINEERING:

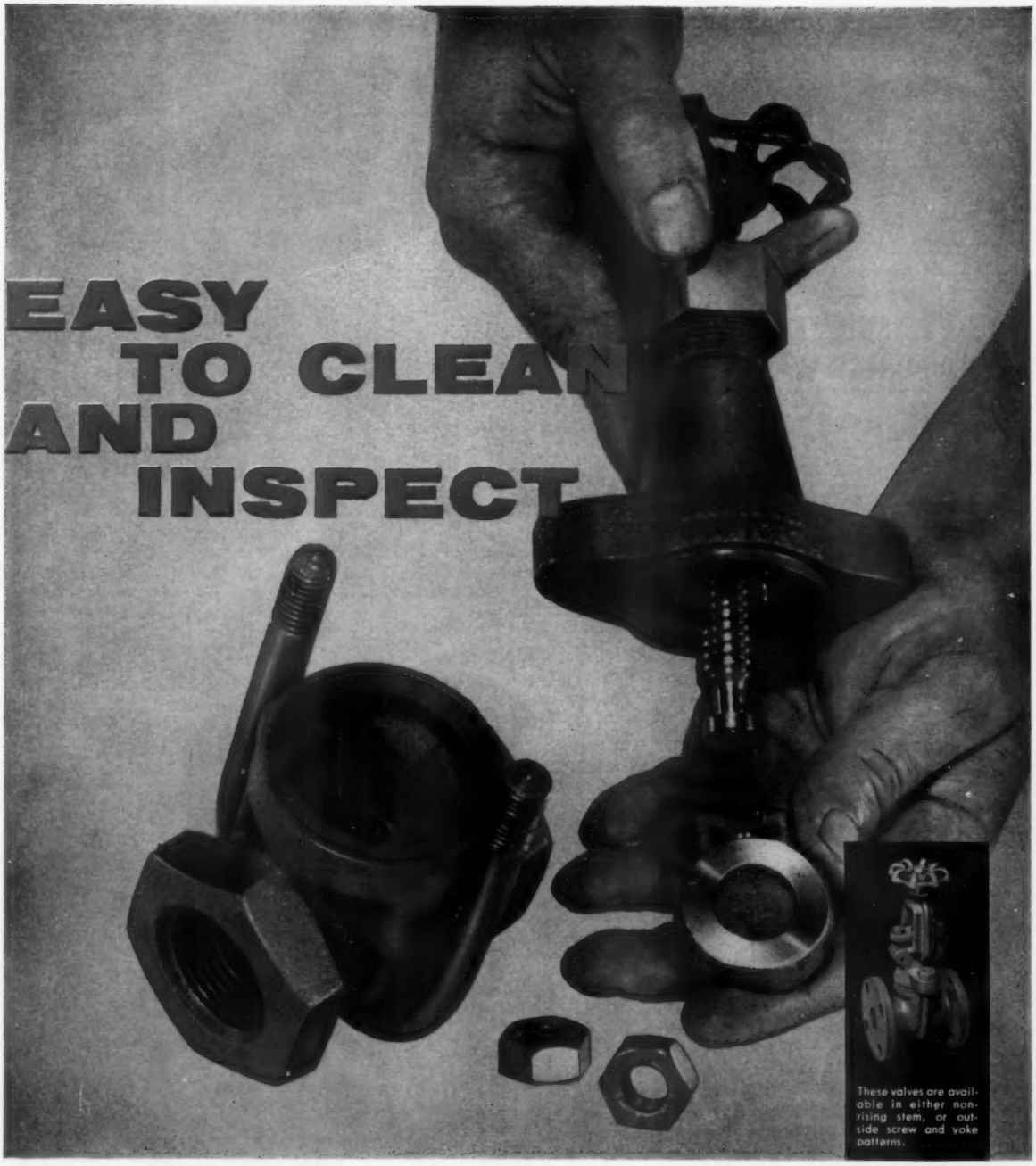
"Please send me two additional copies of the following articles from the March, 1957 issue: Masonry Protection With Silicones'; 'Stainless Steel Study—Part 2—Working the Metallurgical Marvel.'" *Charles J. Scavullo, Legion Utensils Co., Long Island City, N. Y.*

PLANT ENGINEERING:

"We would appreciate receiving two copies of the article entitled 'Engineered Maintenance is Better, 10 Ways,' appearing in the January, 1957 PLANT ENGINEERING." *G. L. Kurchinsky, Maintenance Engineer, Utica Drop Forge & Tool Corp., Utica, N. Y.*

PLANT ENGINEERING:

"If available, please send one copy each




**Walworth iron body saddle type wedge gate valves** are suitable for use on steam, water, gas, gasoline, oil, and many process lines. They are easy to take apart, simple to service, fast to reassemble. Walworth saddle-type valves are available in a wide range of sizes in eleven different combinations of design and materials including bronze-mounted, all-iron, and ni-resist; with both flanged and screwed ends. All types can be repacked under pressure when fully opened or fully closed.

Ask your local Walworth distributor to give you complete information or, write for circular.

**WALWORTH**

*60 EAST 42nd STREET, NEW YORK 17, N. Y*

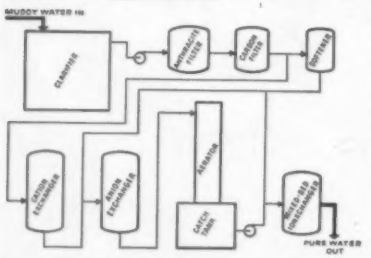
*DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD*

***WALWORTH SUBSIDIARIES:*** ALLOY STEEL PRODUCTS CO. • CONOFLOW CORPORATION • GROVE VALVE AND REGULATOR CO. SOUTHWEST FABRICATING & WELDING CO., INC. • M&H VALVE & FITTINGS CO. • WALWORTH COMPANY OF CANADA, LTD.

**For more facts circle 518 on Reply Card**

ILLCO-WAY
ionXchange

HIGH-PRESSURE BOILERS NEED PUREST WATER




**An ILLCO-WAY System, incorporating up-to-date ionXchange equipment, offers the best opportunity available today for obtaining the high-purity water that modern high-pressure boilers *must* have to avoid serious loss of operating efficiency. Such a System will take the muddiest kind of hard river water and clean it up so that suspended impurities, mineral content, and dissolved solids are reduced to almost unmeasurable quantities. The result — top boiler performance, always, and top *turbine* performance.**

ONE SOURCE FOR THE WHOLE SYSTEM

**Today, such a System can be obtained, *complete,* from a single source — Illinois Water Treatment Company. We design and manufacture every element to solve successfully the particular application. You do not need to combine a part from here and a portion from there — you get it *all* from us, all tanks, all piping, all valves and controls, all resins and other materials, all carefully selected to suit *your* needs. *Consult our experienced engineers at the next opportunity . . .***

ionXchange
ILLINOIS WATER TREATMENT CO.
ILLCO-WAY
840 CEDAR ST.
ROCKFORD,
ILLINOIS
NEW YORK OFFICE: 141 E. 44TH ST., NEW YORK 17, N. Y.
CANADIAN DIST. PUMPS & SOFTENERS, LTD. LONDON, ONT.

For more facts circle 519 on Reply Card

# BACKTALK — FORETHOUGHTS

of these articles which appeared in the December, 1956 issue of PLANT ENGINEERINGS 'Q and A on Pump Problems' by Igor J. Karassik, Worthington Corp.; and 'How to Care for Hydraulic Pumps,' by H. L. Stewart and J. J. Moritz, Logansport Machine Co., Inc." *William C. Burns, Maintenance Engineer, Shell Development Co., Emeryville, Cal.*

PLANT ENGINEERING:

"Will you please send me two copies of 'Structural Design of an Industrial Building Part 1,' as published in the April, 1957 issue of PLANT ENGINEERING." *J. A. Krauth, Resident Engineer, Rayonier, Inc., Hoquiam, Wash.*

PLANT ENGINEERING:

"We have seen a reference to an article which appeared in Vol. 9, No. 12 (1955) of PLANT ENGINEERING, beginning on page 112 and titled 'Cooling Tower Preservation—New Fungi Fencing May Eliminate Wood Deterioration.'

"Can you send us a single reprint or tearsheet of this article?" *Raymond C. Kelly, Executive Manager, Cooling Tower Institute, Palo Alto, Calif.*

▶ Tear sheets of all the articles requested have been sent to our readers with our compliments.—*Editors.*

## Professional Engineer's License

PLANT ENGINEERING:

"In your January, 1957 issue, you had an article headed 'Engineering License Statute.' This article quoted a decision of the Illinois Supreme Court tending to declare invalid the Professional Engineer's license. This has created quite an interest in our council, but in checking, it would seem that this has to do with a decision made back in September of 1944, which is prior to the date of the Professional Engineer's license law now in effect.

"Could you enlighten us a little on this article? Does it apply to the decision above referred to, or is there some recent finding?" *A. F. Hooper, Secretary, Chicago Council No. 1, Universal Craftsmen Council of Engineers, Chicago, Ill.*

▶ Mr. Albert Woodruff Gray, author of "Court Decisions," comments upon the decision quoted in our January issue:

"It (the 1941 act) has been frequently cited as an example of what a statute should not be and when I included it with the other court decisions, it seemed interesting in that particular, with the safeguard against anyone concluding that the law had survived by inclusion of the comment, 'In casting out this statute as unconstitutional, the Supreme Court of that state said . . .'

"After the demise of the 1941 Professional Engineering Act in Illinois, on the declaration, three years after its enactment by the Supreme Court of that state, of its unconstitutionality, the law was repealed. In its place, the legislature adopted, in 1945, another statute of that character that was subsequently amended and made effective July 1, 1953."

## Training Program in Hydraulics

PLANT ENGINEERING:

"We are in the process of working up a short course in hydraulics for our maintenance foremen and are interested in the series of articles by H. L. Stewart and J. M. Moritz of the Longansport Machine Company. We already have copies of the articles numbered 1, 2, 3 and 4, but would like to have copies of 5, 6 and 7 if they are available. A copy of the J.I.C. Symbol Standards would also be helpful.

"If you know of any other suitable material or films that might be available along the lines of hydraulic system maintenance, we would appreciate the information." *C. W. Parkert, Lubrication Engineer, Kaiser Aluminum & Chemical Corp., Trentwood Works, Spokane, Wash.*

▶ While copies of some of the earlier articles in this series are exhausted, more recent ones, including those in the second part of the series which deal with pneumatics, are available.

Other readers interested in sources of training films will find several listed in "Visual Aids—A Gold Mine of Training Help if You Know Where To Dig." This article was published in the July, 1956 issue of PLANT ENGINEERING.—*Editors.*

## A Word From AIPE's President

PLANT ENGINEERING:

"Thanks for the tear sheets and the extra copies of the March, 1957 issue of PLANT ENGINEERING. I appreciate all the publicity you have given to the National Meeting of AIPE as well as the item about our promotion here at Merck Sharp & Dohme." *John M. Waligora, Chief Engineer, Merck Sharp & Dohme, Div. of Merck & Co., Inc., Philadelphia, Pa.*

## Thank You, Sir!

PLANT ENGINEERING:

"Enclosed in $1.50 for which please send me a set of the booklets 'Construction Briefs,' covering the period from May 1953 to August 1956.

"Your magazine, PLANT ENGINEERING, is, in my opinion, the very best of its kind published today. It covers practically all the phases of engineering that I am concerned with. I look forward to each issue." *W. L. Cooper, Martel Mills Corp., Spartanburg, S. C.*

PLANT ENGINEERING:

"Would appreciate it very much if you would send the writer reprint booklets numbers one, two and three of Construction Briefs series.

"Enclosed find my check for $1.50, as I understand that these reprint booklets are priced at 50 cents each." *Milton Marks, Plant Engineer, Crane Co., Chattanooga Div., Chattanooga, Tenn.*

*new Misericordia Hospital will*

# SAVE THREE WAYS*

## BY INSTALLING

## FW PACKAGED STEAM GENERATORS

Lowering one of the 43,500 lb FW Packaged Steam Generators into the basement of the Misericordia Hospital.

SCHEDULED for completion early in 1958, the $8,000,000, 210-bed Misericordia Hospital, Bronx, N.Y., will be fully equipped with the finest and most modern facilities obtainable.

All steam requirements will be supplied by three fully-automatic Foster Wheeler Packaged Steam Generators, each rated 17,500 lb/hr at an operating pressure of 125 psi. Each two-pass steam generator contains 1857 sq ft of heating surface and generous furnace volume. Staggered tube arrangement permits a high heat transfer rate and low exit gas temperatures. These FW Packaged units also offer the following cost-saving advantages:

* **SAVE TIME** — because they were completely shop fabricated and delivered by truck direct to the building site, all ready to set in place and connect to power, fuel and steam lines.

* **SAVE SPACE** — because of exceptionally low ratio of unit size to quantity of steam produced. Measuring only 12'1½" high, 10'11½" wide and 16½' long, these 17,500 lb/hr units are installed on small, low-cost foundations.

* **SAVE MAINTENANCE** — because they are specially designed for easy servicing and inspection. Consisting almost entirely of water heating and steam producing pressure parts, there is a minimum of refractory and tile maintenance.

FW Packaged Steam Generators are available in capacities from 10,000 to 60,000 lb/hr and pressures to 1300 psi. For complete information, send for Bulletin No. PG-55-3. *Foster Wheeler Corporation, 165 Broadway, New York 6, N.Y.*

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# WHITING

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**IMPROVED ROTORS** are solid cast of pure aluminum for greater strength, higher conductivity. Rotor bars are insulated from core to improve motor efficiency.

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# Motors in New NEMA Ratings

# TO 125 HP

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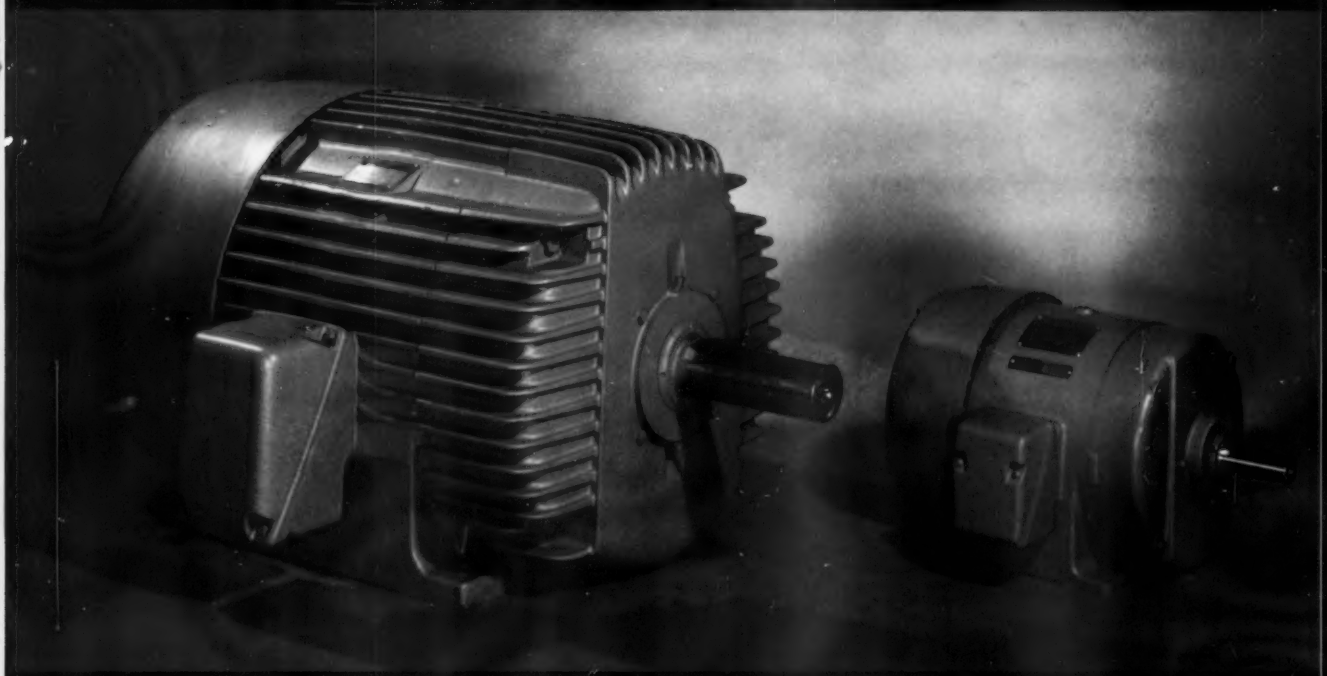
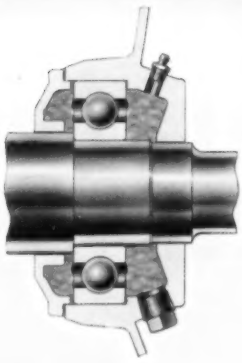


## LONGER LIFE, EASIER MAINTENANCE



**BEARING SYSTEM** uses over-size ball bearings, synthesized grease, long, close-running seals to extend motor life.

**PERMA-NUMBERED LEADS** and roomy conduit box facilitate motor hook-up. Knock-off lugs speed end shield removal for motor inspection.

**GENERAL ELECTRIC** Tri-Clad '55' motors must pass a series of sound, vibration and hi-potential tests prior to shipment. Rigid tests assure uniform high-quality, and long-life performance.

TRI CLAD motors give you top performance. Here's why . . .

**compact . . . power-packed**

# Only G-E TRI 55 CLAD motors give you all these years-ahead benefits

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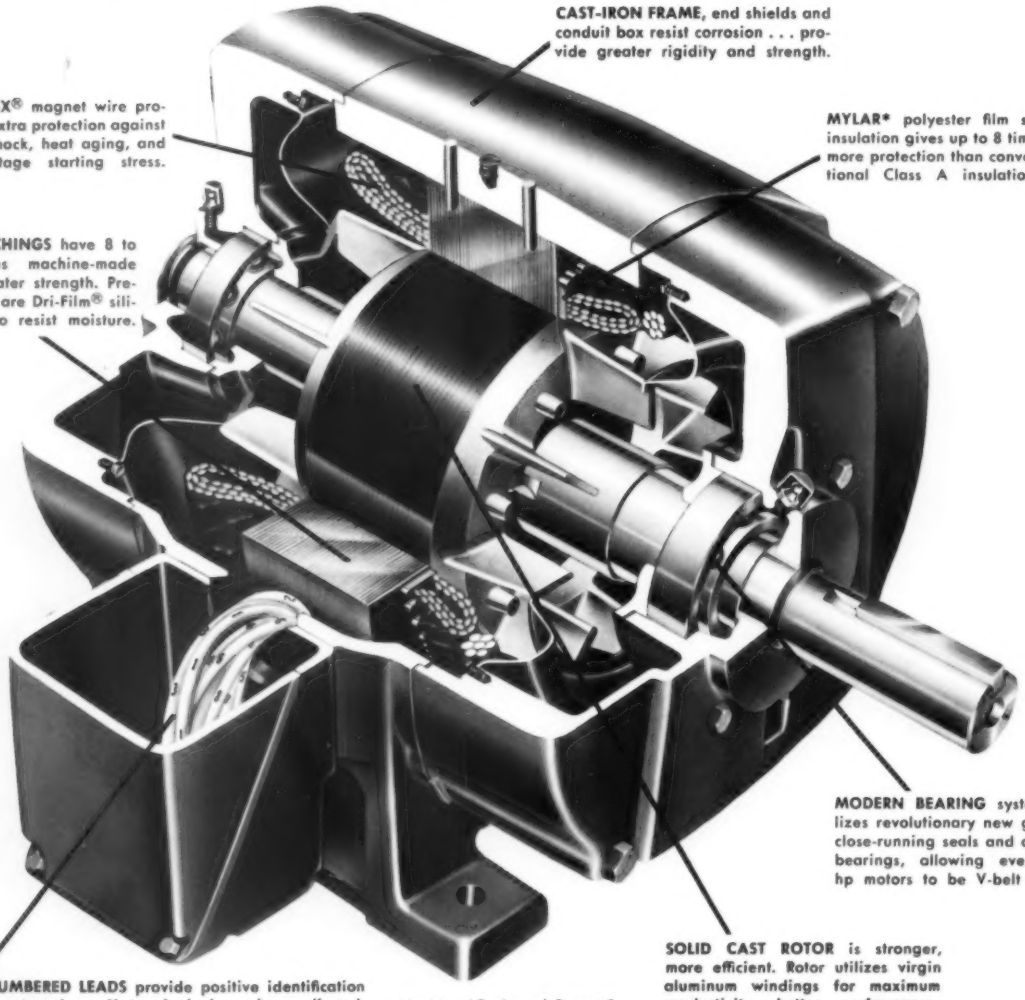

**CAST-IRON FRAME,** end shields and conduit box resist corrosion . . . provide greater rigidity and strength.

**FORMEX®** magnet wire provides extra protection against heat shock, heat aging, and full-voltage starting stress.

**MYLAR*** polyester film slot insulation gives up to 8 times more protection than conventional Class A insulations.

**STATOR PUNCHINGS** have 8 to 16 continuous machine-made welds for greater strength. Pre-wound stators are Dri-Film® silicone-treated to resist moisture.

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☐ **FREE BULLETIN** (GEA-6602) describing the many advanced features of new Tri-Clad '55' motors up to 125-hp.

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**FOR COMPLETE DETAILS on the new line of Tri-Clad '55' motors up to 125 hp, contact your local G-E motor distributor or the motor specialist at your nearby General Electric Apparatus Sales Office. They will give you expert assistance in selecting and applying the right motor for your particular application.**

**For free slide rule to determine weight and space-saving benefits of the new motor, and for informative General Electric Tri-Clad '55' motor bulletin, please send attached coupon.**

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GENERAL ELECTRIC

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With only one resin to work with, production control is simplified. Costs drop. At the same time you cut your inventory expenses. You produce a better product with outstanding solution characteristics.

Here are just a few of the important properties combined in Exon 470: Adhesion to metal, alkyd and vinyl surfaces. High solubility in aromatic hydrocarbons. Alkyd compatibility. Excellent pigment dispersion properties. Abrasion, acid and alkali resistance. Fast baking . . . medium fast drying. Oil, grease and salt-spray resistance. Low moisture vapor permeability. Outdoor durability. Now you need only one resin . . . Exon 470 . . . to make better solution coatings at lower costs.

Exon 470 is just one of the many resins in industry's most complete line of versatile vinyls. It is another reason why industry looks to Firestone for engineering answers to its needs.

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**For more facts circle 523 on Reply Card**

# PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

*Edited by Marjorie E. Weissman*

## Compressed Air System For Grinding Mica

FLUID ENERGY mill system is pulverizing and then classifying mica mined at Petaca Mining Co., Santa Fe, N. M. This compressed air system eliminates the "iron contamination" usually associated with other methods of pulverization.

Wet or dry mica which is to be processed is fed by a screw feeder into a pulverizing chamber where the mica is impacted against itself while entrained in two directly opposed, high velocity streams of air. The mica is then carried to a classification section above the grinding chamber which provides precise control of the end product. This is done by controlling the rotational speed of the classifier blades and the amount of fan air introduced in this section so that only particles of suitable size are discharged from the mill. The oversize particles are returned to points at the ends of the opposing high pressure air nozzles where they go through the process again.

Wet mica is dried by the air in the system. After being discharged from the mill, the mica is conveyed, still suspended in air, to a collection system and deposited in appropriate end product bins.

The system has a capacity of 90 tons of mica in a 24-hr period. Power is provided by 2500 cfm of free air compressed to 100 psig and heated to 800 F which is distributed to the two high pressure nozzles. *From a release of Worthington Corp., Harrison, N. J.*

## Beating Corrosion

GLASS-REINFORCED polyester resin is being used in several locations to combat corrosion by chemicals in the paper and plywood are produced. In British Columbia, where bleached pulp, paper and plywood are produced, to combat corrosion by chemicals. In the pulp bleaching plant, highly acid bleached pulp is conveyed by a mild steel screw conveyor covered with resin and glass fiber. This conveyor was installed 20 months ago and now a similar installation has been made in the mill's second bleach plant.

Reinforced plastic-fabricated sewer

**Equipment handling kraft pulp is lined with glass reinforced polyester resin**

lines are being used in the plant for carrying the corrosive effluent containing chlorine and chlorine dioxide. The resin, both with and without the glass reinforcement, is used extensively as a coating for piping and plywood exhaust ducts exposed to corrosive conditions.

Fan impellers fabricated entirely of the resin and glass have given good

(Continued on page 40)

## Hydraulic Platform Tilts Truck, Tips Oranges onto Conveyor Belt

USE OF TWO HYDRAULIC powered, tilting platform lifts have made it possible to unload a cargo of oranges from a truck in a few seconds at Foof Industries, Inc., Cocoa, Fla., by tilting the truck to a 20 deg incline. The oranges spill out onto a conveyor belt located 20 in. below grade level.

The lift superstructure consists of two parallel, 50-ft long runways of checkered steel plate, 26 in. wide, supported by 24-in. I beams. The overall width of the platform is 8 ft 4 in. Total weight is about 14,500 lb.

The tilting mechanism consists of two hydraulic power cylinders, swivel mounted on a pit near the front end of the superstructure. The plunger rises to a height of 8 ft to provide maximum tilt of the platform. Trunnion connections link the tops of the two plungers with the underside of the platform. During the lifting stroke, the cylinders tilt slightly.

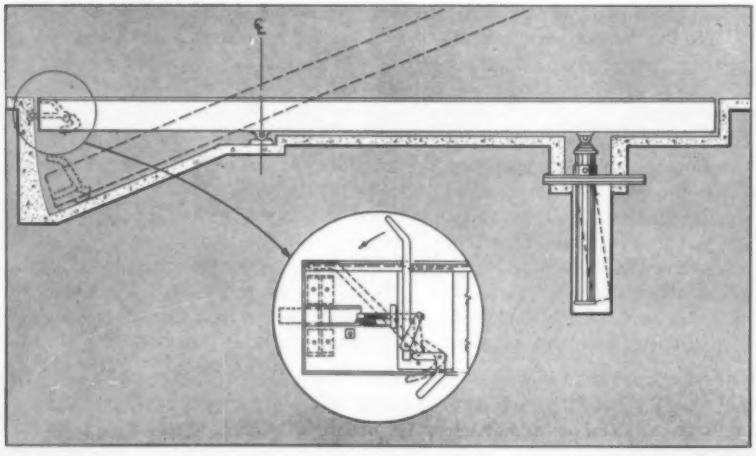

**Diagram of hydraulic lift installation. Inset, detail of spring-loaded locking bars**

Each installation is powered by an oil pump driven by a 5-hp, 1800-rpm electric motor connected to a 220-v, 3-phase, 60-c a-c line with a single holddown, weatherproof pushbutton control.

The entire platform tilts on an axis 17 ft from the rear and lowers to 6 ft below grade level. Manually operated wheel chocks hold the rear wheels of the truck when it is in dumping position. Spring-loaded locking bars, also manually operated, snap into slots when the platform is flush with surrounding area. When a handle is pulled upwards, the locking bars are retracted, permitting the platform to descend into its recess. At the bottom of its lowering stroke, the projecting latch strikes the floor of the pit and the locking bar snaps into place, automatically re-engaging itself when the platform is returned to its horizontal position. *From Lift, published by Globe Hoist Co., Philadelphia, Pa.*

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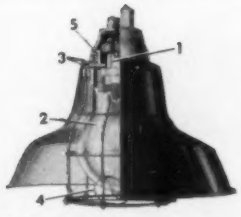
**IN HALF!**

**Adapts For Larger Lamp Size**

**WITHOUT RE-WIRING!**

# *New* CROUSE-HINDS
# VAPORMASTER® Lighting Fixtures




1 *Shock-absorbing receptacle* – takes jolts from any direction. 2 *Pear-shaped globe* – plenty of clearance for lamp. 3 *Vapor-tight seals throughout* – fully gasketed construction. 4 *Globe clamping spring* – flips open for re-lamping – no tools needed. 5 *Aluminum adapter-guard* – 2 sizes fit *all* Condulet bodies.

Here is vapor-tight, shockproof industrial lighting engineered for the greatest possible economy and convenience in both installation and maintenance.

In any indoor or outdoor exposure to moisture, rain, gases, dirt, or corrosive vapors . . . a new standard of operational efficiency is set by the new VaporMaster series. Cleaning and re-lamping is done in half the time, *without tools*. Whenever a demand for a change in lighting intensity develops, a simple change of adapters accommodates the larger lamp – without touching the wiring!

Hundreds of fixture combinations may be assembled from 33 standard components to meet your varying needs. Typical choices:

- *Condulet® bodies* in pendent, ceiling or bracket types and with side hubs.
- Adapters in two forms . . . one for lamps up to 150-watts A23 . . . one for 200- and 300-watts PS30 medium base lamps. Sizes may be changed without disturbing wiring merely by installing adapter for the desired lamp.

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**For more facts circle 524 on Reply Card**

# PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

service in the plant for the handling of moist sulphur dioxide gas. In addition, steel sewer lines and ceramic and wooden exhaust stacks are protected from corrosion in the same manner. *From Plastics Newsfront, published by American Cyanamid Co., New York, N. Y.*

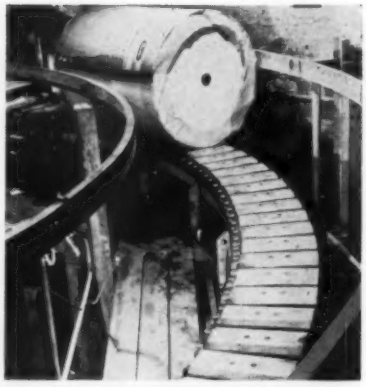
## Interfloor Conveyor for Newsprint

FIVE HANDLING JOBS, including vertical and horizontal movement and automatic transfer between several conveying elements, are performed by a single automatic interfloor conveyor at the plant of the Pittsburgh, Pa., Sun-Telegraph newspaper.

All of the operations are performed automatically and controlled from push-button panels at load-unload stations. Only personnel required for each of these operations is a man at the load point and a man at the receiving station.

Rolls of newsprint are delivered by truck to a receiving area in the newspaper plant. A hydraulic conveying mechanism carries rolls to the ground floor station of the conveyor, where they are positioned for loading on a large turntable. With the gig of the vertical conveyor in position for receiving a load, the operator pushes a roll into the conveyor. He then sets a selector switch on the control panel, establishing which floor the roll is to be delivered to and pushes a start button.

The gig descends at a speed of about 55 fpm. As it approaches its destination, a ¾-hp tilting motor, housed on top of the gig, is activated by a limit switch. This tilts the bottom of the gig and the roll is propelled forward to the receiving point.



**Curved section of conveyor shows specially designed slats that support roll**

For delivering rolls to the press room, an auxiliary transfer conveyor and a horizontal conveyor are used. The vertical conveyor delivers the roll to the auxiliary conveyor, tilting and feeding it by "fingers" into the cradle-

(Continued on page 42)

## "Cascade" Temperature Control Compensates for Load Changes in Continuous Steel Strip Annealing

IN CONTINUOUS annealing of steel strip for tin plate, the Steel Company of Canada, Ltd., Hamilton, Ontario encounters frequent load changes due to varying speeds and different widths or thicknesses of strip. To hold annealing temperature precisely with these load changes, an interlocked intrument combination, known as "cascade control" is employed. The system uses a radiation pyrometer to quickly detect the effects of load changes and to reset individual zone controllers.

In addition to cascade control of zone heat inputs, a similar system measures and controls the exit strip temperature from the controlled cooling zone.

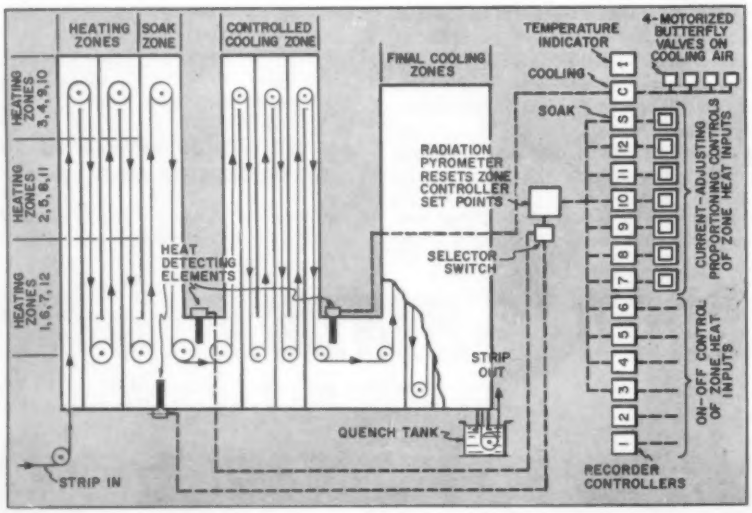
The strip travels up and down a distance of 42 ft through 12 individually controlled heating zones. This is followed by a soak zone, a controlled cooling zone, a final, uncontrolled cooling zone, and a quench. For the heating and soak zones, strip chart recorder-controllers measure the zone temperatures with thermocouples installed through the furnace walls. These instruments regulate current input to heating elements in each zone.

The two controllers for zones one and two are not reset from the master radiation pyrometer because the furnace uses maximum input to heat entering strip.

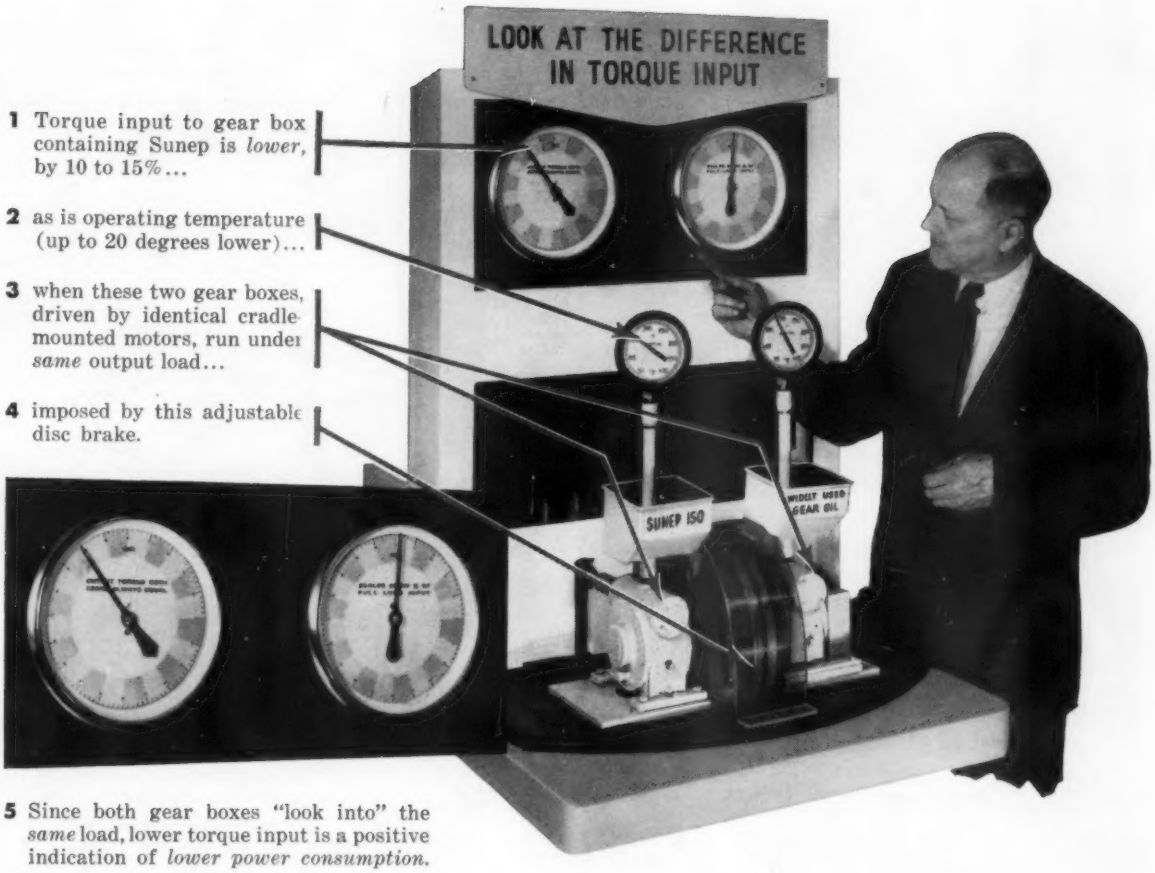
One heat radiation detecting element sights directly on the strip as it leaves the last heating zone. It is sighted up through the furnace bottom, measuring the actual temperature of the moving strip. Similarly, a second element measures the strip temperature as it leaves the soak zone. Under normal operation, both temperatures should be identical and only one is used to reset the zone controllers.

A recorder-controller logs the selected strip temperature and electrically adjusts the set points of heating zone controllers three through twelve, and also the soak zone temperature controller. If the strip temperature starts to drop below its set point the master controller automatically starts to raise the set points of individual zone controllers. This increases the heat input to balance the greater load and quickly brings the exit strip temperature back to its set point.

A third heat-detecting element sights on the strip as it leaves the controlled cooling zone. This temperature measurement is recorded by a strip chart recorder-controller. The instrument has proportioning type electric control which operates four electric drive motors to position four butterfly valves on separate cooling air lines. Electrical bias adjustments on the drive units permit variation in the relative amounts of cooling air to each section of the zone. *From a release of Leeds and Northrup Co., Philadelphia, Pa.*




**Schematic of temperature control system on continuous strip annealing line**


LOOK AT THE DIFFERENCE IN TORQUE INPUT
1 Torque input to gear box containing Sunep is *lower*, by 10 to 15%...
2 as is operating temperature (up to 20 degrees lower)...
3 when these two gear boxes, driven by identical cradle mounted motors, run under *same* output load...
4 imposed by this adjustable disc brake.
SUNEP 150
5 Since both gear boxes "look into" the *same* load, lower torque input is a positive indication of *lower power consumption.*

*This test rig proves...*

# SUNEP CUTS POWER CONSUMPTION, REDUCES OPERATING TEMPERATURES

TIME AND AGAIN, under equal operating conditions, Sunep® gear lubricant has demonstrated its superiority over competitive oils. Sunep is a high-quality, extreme-pressure lubricant that is also recommended for screws and heavily loaded bearings.

In addition to extreme-pressure characteristics, Sunep has the ability to combat rust and corrosion. All additives are compatible and do not drop out during use or prolonged storage. These advantages add up to savings in money and equipment for you.

For complete information about Sunep oils, call your Sun representative or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. PY-7.

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**For more facts circle 525 on Reply Card**

How does Carling's make every cool stein

**TASTE THE SAME?**

Accurate control is the answer. For instance, to make sure every drop of Carling's is formula-perfect, more than a dozen of these Neptune meters accurately measure and record liquids used in various stages of the process at Carling's new brewery in Natick, Mass. Principal uses are in finishing and blending, in filtration and carbonation rooms, and in wort processing.

Flow of liquids is registered automatically and continuously by the Neptune Meters with big time-savings over the batch-measuring methods previously used. According to Roger D. Williams, plant engineer, the Neptune meters are accurate and trustworthy, and are valuable for inventory control in addition to quality and uniformity control.

Find out how Neptune Meters will benefit your operation by sending for Meter Application Bulletin 566-EPE

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For more facts circle 526 on Reply Card

# PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

like auxiliary conveyor. This conveyor, powered by a pneumatic cylinder mechanism, is activated by a switch that can only be contacted when the roll is properly positioned. As the auxiliary conveyor completes its downward motion, it contacts a switch that returns the main vertical conveyor to its original load position.

The auxiliary conveyor descends a distance of about 4 ft to this horizontal conveyor. Mechanical fingers at the discharge point transfer the roll to the horizontal conveyor, which is activated by another switch.

The horizontal conveyor consists of a short, straight section of powered and free rollers, a 90 deg curved conveyor and a final straight section running into the press room.

The curved conveyor has specially designed steel slats attached to a single chain. Each slat has three outboard flanged rollers which provide the main support for the roll and maintain its original loading position.

At the end of the curved section, the roll is received on a series of powered and free rollers. It hits a limit switch, which positions it in front of a discharge pusher, powered by an air-cylinder-operated ram. This pushes the roll off the conveyor at a 90 deg angle to the conveying line and delivers it into the press room proper.

Motors used in the system include a 7½-hp motor for the main gig hoist, a 3-hp motor for the curved section of the horizontal conveyor and a 1½-hp motor for each of the straight powered roller sections of the horizontal conveyor. *From a release of Gifford-Wood Co., Hudson, N. Y.*

## Magnet Finds Hidden Holes

PITY THE POOR mechanic who is faced each working day with the job of drilling holes through airplane skins to match hidden holes in structural members of planes under construction. These holes are in locations he can not see and he must use an improvised template or back-marking gadget. Often, he must find some way to drill a pilot hole from the inside to mark the location on the outside.

An instrument invented by William L. Morse, Boeing manufacturing research engineer, has solved this problem.

To use the tool is simple. First, a small magnet is inserted in the hidden hole in the structural member. Then,

GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified
Special hose to resist severe abrasion
C
B
A
A Special tube of very high abrasion-resistance
B Multi-ply, wrapped fabric reinforcement for high-burst strength and resistance to shock blows
C Long-wearing, abrasion-resisting cover

# 71 days for pipe—over 4 years for hose

Carrying off highly abrasive sand- and coal-dust slurry was plain murder on the heaviest steel pipe used at this Pennsylvania coal-cleaning plant. None lasted more than 71 days. Then there'd be another shutdown—and another expensive reinstallation.

But that was before the G.T.M.—Goodyear Technical Man—recommended a special hose designed for super-resistance to abrasion. At last check, *this hose had been in service 1500 days—more than 4 years.* And it was still going strong.

Looking for an equally moneysaving answer to your industrial rubber problem? Check with the G.T.M. You can reach him through your Goodyear Distributor—or by writing Goodyear, Industrial Products Division, Akron 16, Ohio.

**GOODYEAR**

**THE GREATEST NAME IN RUBBER**

**IT'S SMART TO DO BUSINESS** *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

# want quality slings?

The slings you use have to be the best. There's too much at stake—the safety of your crew, your equipment and the material they're handling. How can you make sure that the slings you have are the best available? Ask your supplier these questions:

**Does the maker produce his own steel?**

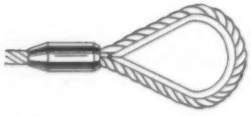
*Then does he carefully test the results?*

**Does he process this superior steel into top-quality wire?**

*Then does he carefully test the results?*

**Does he make this superior wire into top-quality wire rope?**

*Then does he carefully test the results?*



**Does he fabricate this superior wire rope into top-quality slings?**

*Then does he carefully test the results?*

If you receive even a single "no", it'll pay you to get the Wickwire story . . . to see how Wickwire Wire Rope Slings are made—from blast furnace to testing of the completed sling—by a *single* company with over a century and a quarter of wire-making experience. Contact the nearest sales office below today.

CF&I

**WICKWIRE**
**WIRE ROPE SLINGS**
**PRODUCT OF WICKWIRE SPENCER STEEL DIVISION**
**THE COLORADO FUEL AND IRON CORPORATION** 4236

THE COLORADO FUEL AND IRON CORPORATION—Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City
Tulsa • PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.)
New Orleans • New York • Philadelphia • CF&I OFFICES IN CANADA: Toronto • Montreal

**For more facts circle 528 on Reply Card**


## PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

the instrument, which contains a sensing tube housing a jewel-mounted pointer, is placed on the outside skin in the vicinity of the hidden hole.

The pointer is tipped with a magnet having a polarity opposite that of the small magnet already inserted in the

**Hidden holes are located and drilled in aircraft skin with special instrument**

hole. As the instrument is moved slowly around the outside skin, the pointer seeks the hidden magnet.

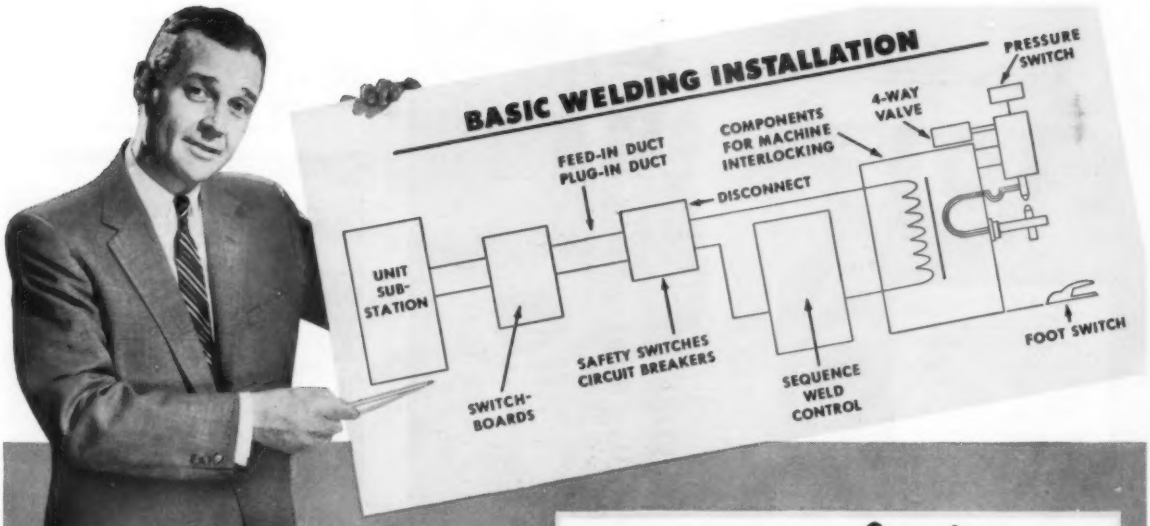
Once the position of the hole is determined, it is little trouble to find out where to drill the hole. A slide arrangement supports both the pointer and the drill bushing. The slide is shifted as far to the left as it will go. This brings the drill bushing directly over the hidden hole. A small drill is inserted in the bushing and a pilot hole is drilled through the skin. Use of the instrument can be adapted to locating broken taps, reproducing templates and other jobs where it is necessary to transfer hidden points to the surface. *From Boeing Magazine, published by Boeing Aircraft Co., Seattle, Wash.*

### Simplified Storage

AUTOMATIC FIRST-IN, first-out inventory control, fool-proof organization, centralized order picking and physical separation of the picking and replenishing operations, have resulted from the use of gravity-flow storage racks at all branch warehouses for the laboratories of Wyeth, Inc., Philadelphia, Pa.

The system takes into consideration the number and size of packages, length of storage, frequency of need for specific items and physical arrangement of existing storage space.

Storage racks consist of separate gravity-flow lanes mounted on adjust-




# Here's the Easy Way

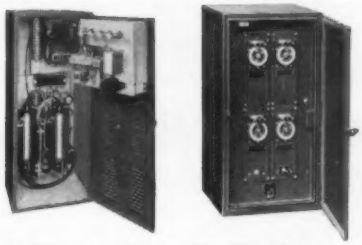
## TO A BETTER WELDING INSTALLATION

• Whether you start from scratch or expand an existing operation, your Square D Field Engineer has two important things to offer to make your job easier.

First, he has the background which enables him to offer sound counsel at the planning stage. Second, he is backed by a complete line of performance-proven electrical equipment with which to put practical planning into action.

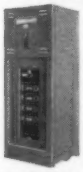
Field Engineers are available through Square D branch offices in all principal United States cities—and in Canada, Mexico and England. Backing up these engineers are the design and manufacturing facilities of 14 strategically located Square D factories and the localized services of a nation-wide network of authorized electrical distributors.

### SQUARE D DOES THE *Complete* JOB!



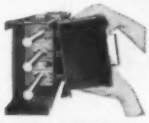
ELECTRONIC and MAGNETIC WELDER CONTROL

SUBSTATIONS



SWITCHBOARDS

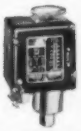
FEED-IN DUCT



PLUG-IN DUCT

SAFETY SWITCHES

LIMIT SWITCHES

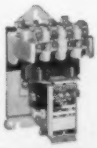


PRESSURE SWITCHES

4-WAY VALVES

PUSHBUTTONS

SELECTOR SWITCHES



CONTROL RELAYS

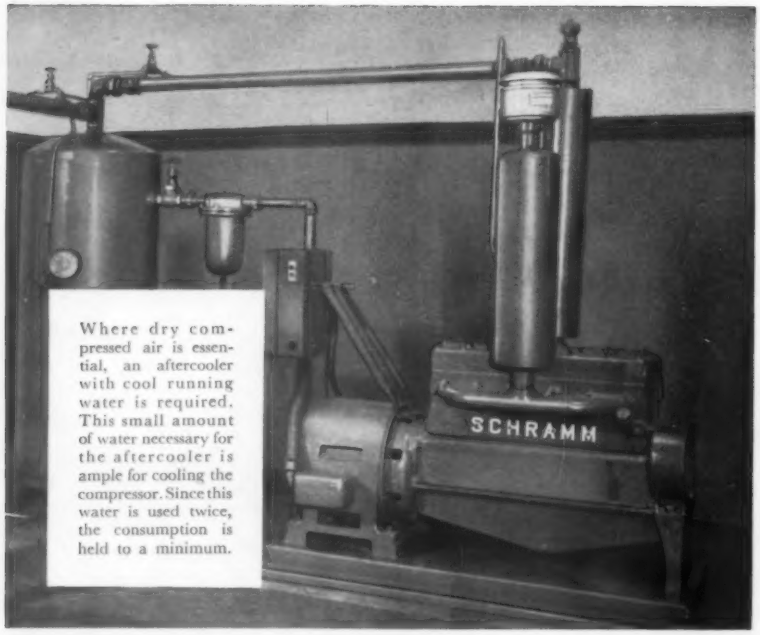
FOOT SWITCHES

PILOT LIGHTS

**NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE**

**SQUARE D COMPANY**

For more facts circle 529 on Reply Card




Where dry compressed air is essential, an aftercooler with cool running water is required. This small amount of water necessary for the aftercooler is ample for cooling the compressor. Since this water is used twice, the consumption is held to a minimum.

COMPRESSOR EXPERT EXPLAINS WHY:

# Your compressed air need not be wet

Water in compressed air systems is a costly nuisance. It can ruin spray-painting jobs, make sand-blasting ineffective, or rust air tools beyond repair. How does it get in—and how can it be kept out?

Water gets into compressed air systems because *all* atmospheric air contains moisture. When you compress air, you raise its temperature—and its moisture-carrying capacity. When it cools in air receivers and lines, it loses its ability to carry moisture and as much as 80% of the moisture becomes water. This can amount to as much as 2 gallons per hour. But NOT where a Schramm *dry compressed air system* is used.

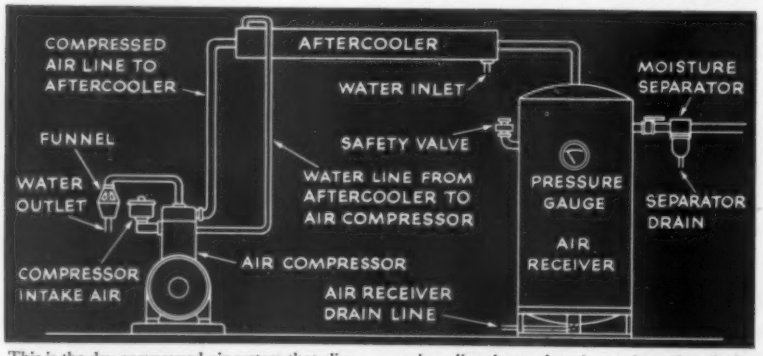
With a Schramm Industrial Air Compressor and Aftercooler, water can be almost completely eliminated. You get *dry compressed air* because the Schramm system places an aftercooler in the line between the compressor and the air receiver. The aftercooler reduces air temperature to a point where most of the moisture is condensed into water and no further precipitation occurs. Most of the water falls out in the receiver and is expelled by an automatic trap, while the remaining water is removed in the separator. The small amount of moisture remaining in the air will be invisible vapor and will cause no trouble.

Our new folder, "Compressed Air Isn't All Wet," is packed with information you'll want if you have a moisture problem. Write for your copy today, there's no obligation.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.




This is the dry compressed air system that eliminates objectionable water. Note placement of Schramm Aftercooler between Schramm Compressor and air receiver. With compressed air going directly to the air receiver *through* the aftercooler, most of the moisture falls out in the receiver and leaves less for the separator to remove. Result: drier compressed air.

For more facts circle 530 on Reply Card


# PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

**Storage racks for pharmaceuticals are adjustable to any size and weight carton**

able frames. Each deck of the rack is adjustable for height, while lanes are adjustable for width. Cartons can be stored directly on the racks; smaller packages are carried on pallets. *From a release of The Alvey-Ferguson Co., Cincinnati, Ohio.*

## Mix Your Own Cutting Oil

In addition to pre-blended cutting oils, a number of oil additives or concentrates are being used. These additives can be mixed in the shop with mineral oil in a percentage suitable for the job.

A single concentrate and a single base oil can often fill the needs of a department with varied cutting oil requirements. A concentrate, for example, can be diluted in a standard base oil, in percentages suited to each particular job. These jobs might require a four per cent dilution which would be satisfactory for the majority of machines; an eight per cent dilution for drilling and reaming cast steel; and a two per cent dilution for a thread grinding operation on 1112 steel.

It is also possible with oil concentrates to strengthen a cutting oil if the job changes. If a machine turning 1112 steel with a one per cent dilution is scheduled to turn, drill and bore a part of 1010 steel, the strength of the cutting fluid can be increased to a three or four per cent dilution by adding more concentrate to the coolant sump.

On a multiple operation machine the cutting oil can be mixed to handle most of the operations and the concentrate itself applied directly to the toughest one.

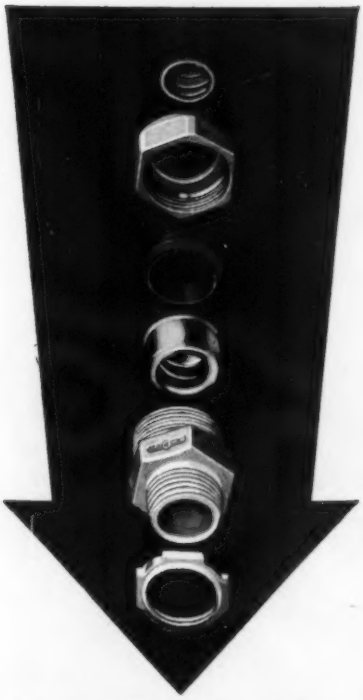
When using a concentrate it is also

# GEDNEY

## TOPS THEM ALL!

*...in malleable iron quality*
*...in accurate machining*
*...in smooth-fitting threading*

**ROCK-BOTTOM INSTALLATION COSTS**... specify Gedney. Machined and threaded with utmost accuracy... smooth-finished, with no metal particles or burrs ... made of the best malleable iron to eliminate breakage... individually inspected to insure absolute top quality. For today's lowest installation cost... specify Gedney!



**LIQUID-TITE CONNECTORS**

The most dependable liquid-tight connectors available today. For use with "SEAL-TITE" and equivalent Liquid-Tite Flexible Conduit. Designed to give wiring absolutely dependable protection against water and oil. Built for lifetime service. Available in sizes ⅜" to 2"... straight... 45° and 90°.

**90° CORNER ELLS**

Top-quality Malleable Iron, cadmium plated. Fitted with gasketed cover. Both ends female. Available in a full range of sizes from ½" to 2".

**90° CORNER ADAPTERS**

Top-quality Malleable Iron, cadmium plated. Fitted with gasketed cover. One end male, one end female. In sizes from ½" to 2".

**GEDNEY FITTINGS FIT**

**For more facts circle 531 on Reply Card**

**GEDNEY**
**ELECTRIC COMPANY**

GEDNEY

RKO BLDG., RADIO CITY, NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

ELLIOTT
Twin Strainers
for
Dependable
Continuous
Service
WHILE THIS ONE IS BEING CLEANED
THIS TWIN IS IN SERVICE . . .
While flow goes through this compartment
This one is closed for cleaning. Back-flushing water enters at side, drains at bottom.

**Twin Strainer with special back-flushing feature**

Elliott Twin Strainers are built in two types. With Type A, one strainer basket is removed and dumped, while liquid flows through the other basket. Type A strainers are also built with a back-flushing feature, whereby the closed-off compartment is cleaned by reversing the liquid flow. Flushing and draining connections permit liquid to enter side of compartment, flow through basket and drain at bottom. Type V, with large-size baskets, is designed primarily for handling oil and viscous liquids.

For over 50 years, Elliott Strainers have been effectively removing objectionable solids from water and other liquids. The resulting trouble-free service has led to installations in power and industrial plants all over the country. Elliott also makes Single Strainers, one type having an Automatic Self-Cleaning feature, the other type with a removable basket for manual cleaning. For details call your Elliott District Office or write Elliott Company, Accessories Department, Jeannette, Pa.

A7-1

**ELLIOTT Company**

STEAM TURBINES • MOTORS • GENERATORS • DEAERATING HEATERS • EJECTORS • CONDENSERS • CENTRIFUGAL COMPRESSORS • TURBOCHARGERS • TUBE CLEANERS • STRAINERS

**For more facts circle 532 on Reply Card**


# PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

possible to reclaim the base oil. Coolants can be filtered and used over again by adding some new oil concentrate to restore cutting properties.

By tailoring the cutting oil to the job, there is no need to use a heavier-than-necessary cutting oil on an easy job. At the same time, there is no need to stock a different cutting oil for each degree of machining difficulty experienced in the shop. When it is necessary to strengthen the mixture, production time is not wasted pumping out weak oil and perhaps throwing it away, and then pumping in a stronger blend.

Usually two oil concentrates (one for ferrous metals, the other for nonferrous), plus a quantity of mineral oil will meet all requirements. *From Report, published by The Cincinnati Milling Machine Co., Cincinnati, Ohio.*

## More Light With Plastic

To SOLVE the dim-out problem caused when opaque materials are used to seal off the space between a window air conditioner and the side of the

**Plastic panel does away with dim-out in installation of window air conditioner**

window sash, ⅛-in thick clear acrylic plastic is being used in a Washington, D. C. office.

Plastic should be cut slightly undersize and mounting holes should be drilled slightly oversize to enable the panel to accommodate to thermal expansion and contraction.

After the mounting holes are drilled, the panel is installed by screwing it directly to the window sash with wood or metal screws. Where sash is worn or bent, calking material applied around the edges of the panel can help produce an airtight seal. *From a release of Rohm & Haas Co., Philadelphia, Pa.*

Loren Farris
**PERSONNEL DIRECTOR**
Detroit Division
Chicago Rawhide Manufacturing Co.

*"Look! It soaks up grease just like a sponge."*

LAN-O-KLEEN removes 95% of all dirt and grime encountered in industry.
Easily — and safely!

LAN-O-KLEEN helps to protect the skin as it cleans. WEST — in pioneering the development of "double action" industrial cleaners — was the first to impregnate beneficial amounts of free lanolin into a corn meal type hand cleaner.

LAN-O-KLEEN is economical to use. It bulks greater than most other hand cleaners — therefore goes farther per pound. Too, the sturdy LAN-O-KLEEN dispenser rations just the right amount to do a quick, thorough cleansing job.

# "We know of no safer hand cleaner than Lan-O-Kleen"

**"We've always been interested in preventing dermatitis. This is why we've supplied our plant employees with Lan-O-Kleen for the past ten years. Its free lanolin and soft cleansing action help prevent skin irritations, yet quickly remove dirt, grease and grime," says LOREN FARRIS, Personnel Director, Detroit Division of Chicago Rawhide Manufacturing Company.**

**"Several of our departments have also used West Antiseptic Protective Hand Creams for a number of years. We know these aids to comfort and safety help keep our workers on the job at maximum efficiency."**

**Would similar results interest you? Send the coupon.**

**LARGEST COMPANY OF ITS KIND IN THE WORLD**

WEST DISINFECTING Company

WEST DISINFECTING COMPANY, 42-16 West Street, Long Island City 1, N. Y.
Branches in principal cities • In Canada: 5621-23 Casgrain Avenue, Montreal

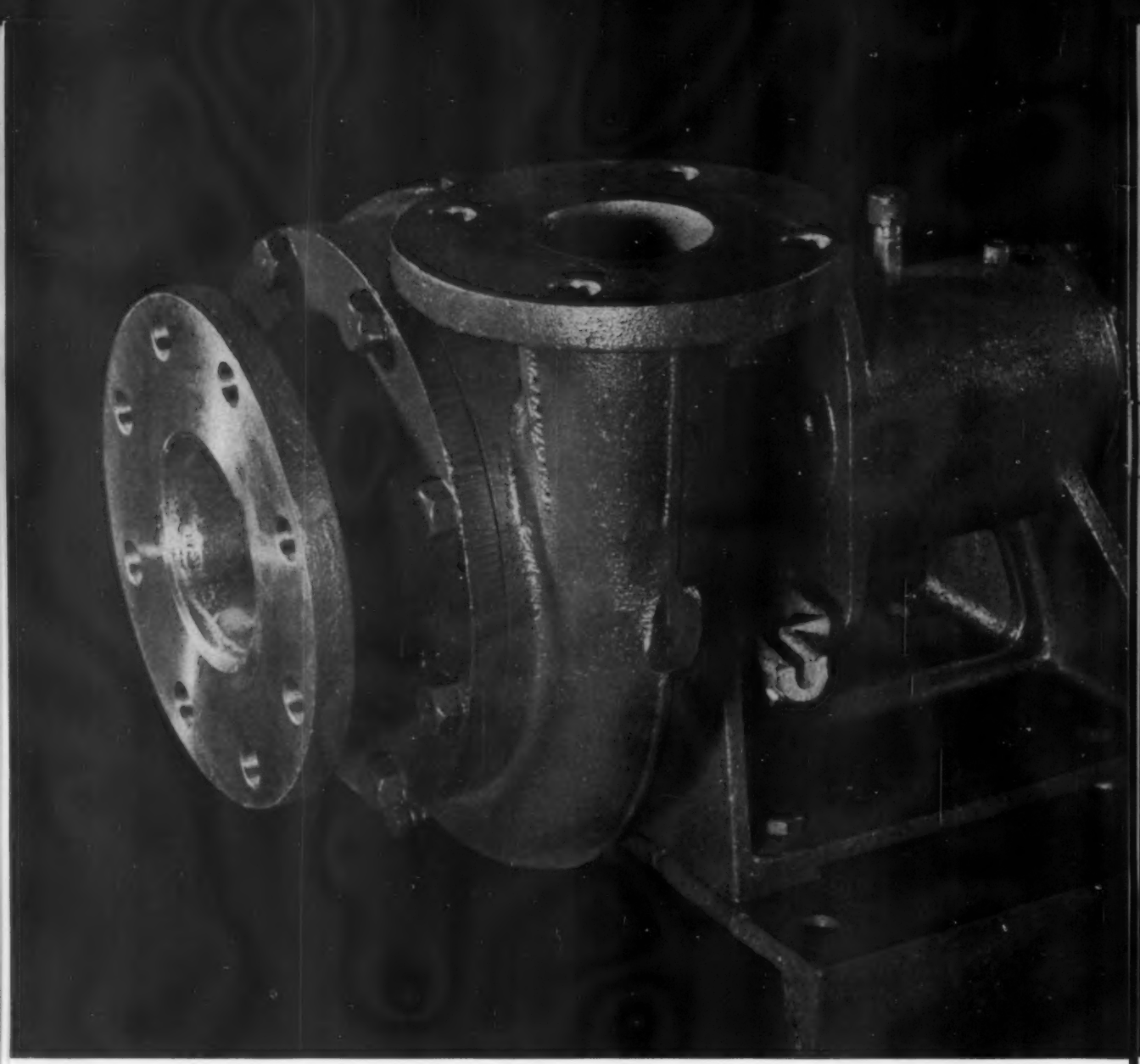
☐ Please send your 24 page booklet "The Control of Dermatitis in Industry."
☐ Please have a West representative telephone for an appointment.

Name.....

Position.....

Mail this coupon with your letterhead to Dept. 19

**For more facts circle 533 on Reply Card**



# HOW TO BUY A $750

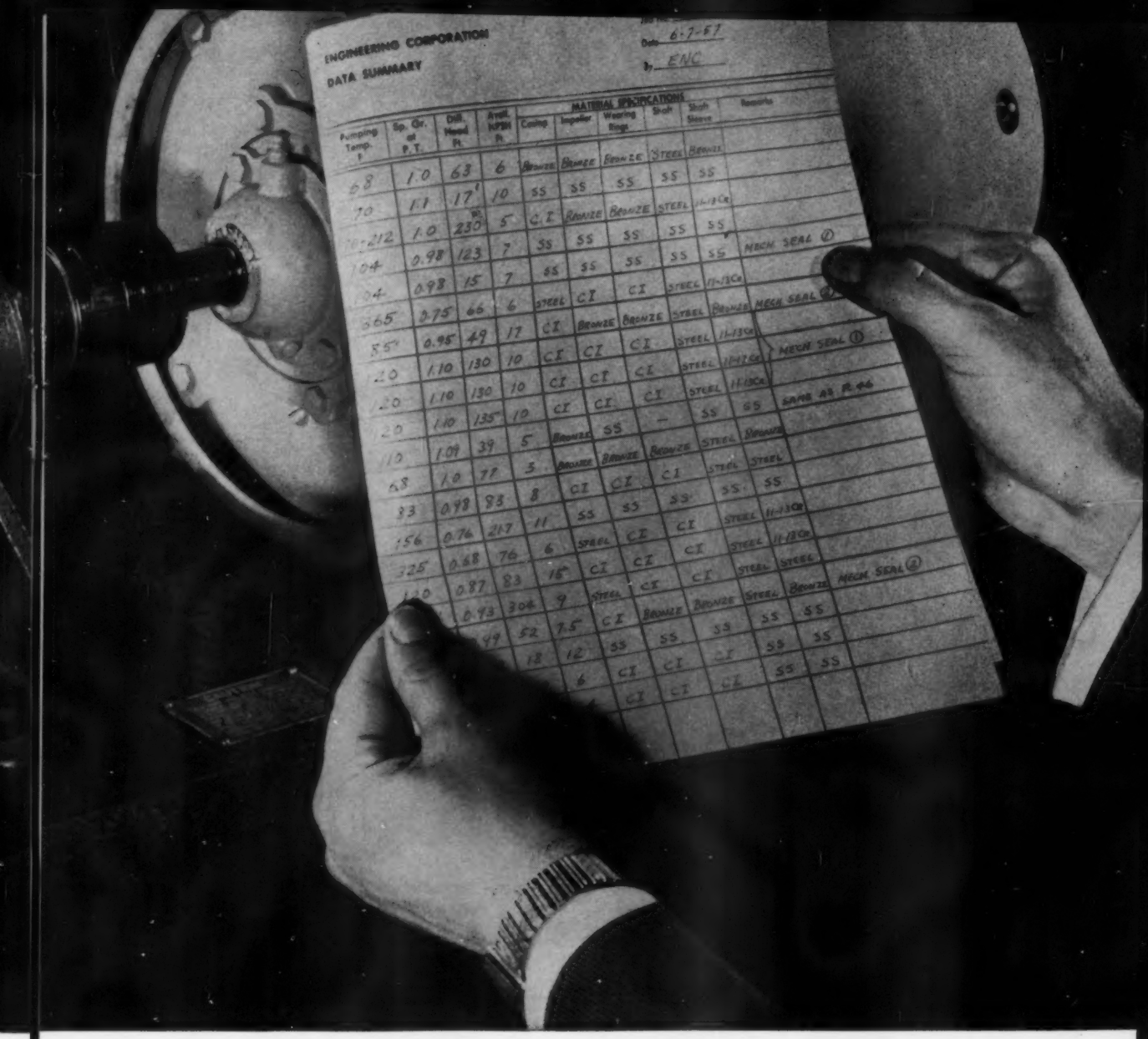
When you need a "special" pump, Worthington's SESC (Standard End Suction Centrifugal) line will often prove the low-cost answer.

For example, the chart above shows specifications for 21 different pumps, with a variety of materials of construction, which would ordinarily involve manufacture of special pumps. However, because all of these materials are available from the SESC line, the pumps can be bought at big savings.

The secret of Worthington's ability to give you many normally special pumps at standard prices is the flexibility of the SESC line. *Parts* have been standardized, but not *pumps*. As a result, you can literally "custom-build" your pump to get exactly the right features to meet your requirements.

**70,480 COMBINATIONS TO CHOOSE FROM.** You have a choice, for example, of four materials of construction—iron, steel, bronze, Worthite* and combinations of these. You have a choice of five types of liquid ends and five different drives. You can choose packed stuffing box or mechanical seal operation. In all, there are 70,480 combinations—all built from standard, stocked parts and ready for prompt delivery at competitive prices.

*A high nickel, high-chromium, low-carbon alloy steel. Trademark Reg. U. S. Pat. Off.




# PUMP FOR $300!

**STANDARDIZATION PAYS OFF LATER.** After you have installed an SESC pump, you benefit again from Worthington's broad standardization program. Since all pumps in the line are built from interchangeable parts, your spare parts inventory can be cut as much as 50%. Should repairs or conversions become necessary, parts interchangeability can often mean reduced downtime.

The complete SESC line consists of six separate types of pumps, all suitable for either motor, turbine or belt drive. Ratings range up to 2,700 GPM and 550 ft. head. If you'd like to know more, write for Bulletin W-300-B4. Worthington Corporation, Harrison, N. J.

**CUTS MAINTENANCE**
*If you know one SESC pump, you know them all. From the smallest to the largest the entire line is built to the same basic design. Maintenance men quickly become familiar with its construction details.*

**WORTHINGTON**

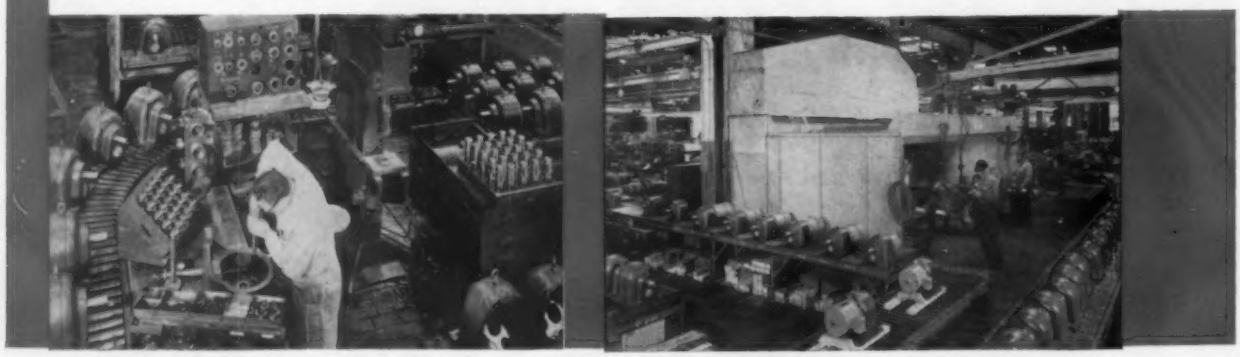
For more facts circle 534 on Reply Card

# What do you need

## Quick delivery from stock... LINK-BELT enclosed drives offer exact, efficient answers to any combination of service factors—ratio, speed, hp, load

**COMPACT, CAST IRON, CORROSION-RESISTANT HOUSINGS** prevent oil leakage . . . provide great rigidity . . . maintain permanent alignment of all parts. In addition, Motogear, Gearmotor and In-Line helical gear drive housings provide for the latest NEMA motor sizes.

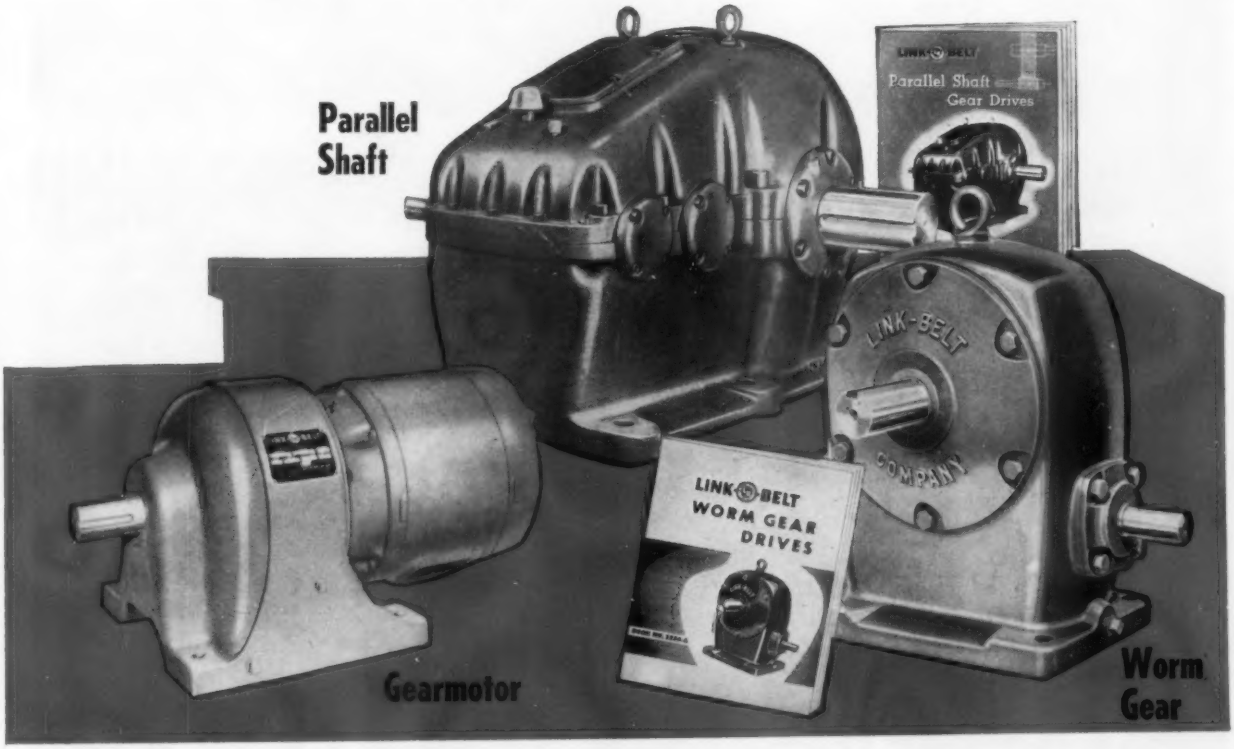
CHANCES are that every production operation in your plant requires its own combination of drive characteristics. And Link-Belt's complete line of speed reducers gives you the right answer to every need every time . . . plus convenient, one-source supply. Each drive is designed in response to a basic industrial requirement . . . with types



**CAREFUL ASSEMBLY OF PRECISION PARTS** assures proper fit, long life. Here operator assembles gear and bearings on shaft. Sturdy bearings protect against shock and overloads. Hardened gears produced on modern hobbers are shaved, assuring efficient power transmission.

**MODERN PRODUCTION-LINE FACILITIES** assure the economies of mass production plus abundant supply. From initial manufacturing stages through final inspection, facilities and techniques—including this spray painting operation—are among the most modern in industry.

# in speed reducers?



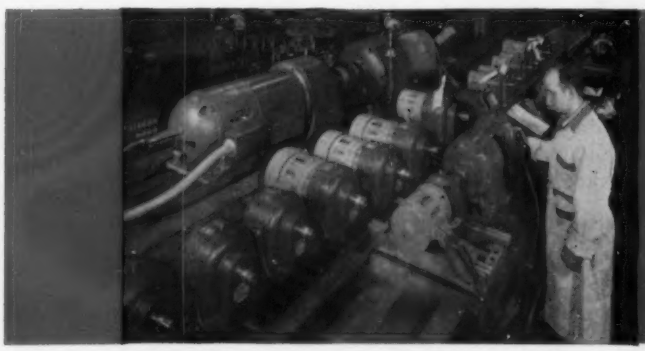

for specific variations in service conditions.

Link-Belt also makes industry's most extensive line of related power transmission products, and can supply complete, job-mated, pre-engineered drive combinations. The next time you need a drive, see your Link-Belt district office or authorized stock-carrying distributor. Ask for literature.

**LINK-BELT**

**ENCLOSED DRIVES**

**LINK-BELT COMPANY:** Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,579



**LOAD TESTING** with the latest in instrumentation is one of many Link-Belt quality controls. Such thorough tests are your assurance that the drive you buy is leak-proof . . . all parts are properly aligned . . . unit is effectively sealed for long, trouble-free performance.

**SOUND TESTING** with sensitive sound-level meters provides additional proof that drives are in perfect working order. Extreme quietness of Link-Belt enclosed drives is the result of perfect mating of gears and sound-dampening property of cast iron housings.

**For more facts circle 535 on Reply Card**

FLUORESCENT: over 290 different lamps for business and industry
MERCURY: 62 types from 85 through 3,000 watts
New economy
and efficiency
in industrial and
commercial lighting
Westinghouse Job-

## Now you can have exactly the right *kind* of lamp in exactly the right *size* for every individual lighting job

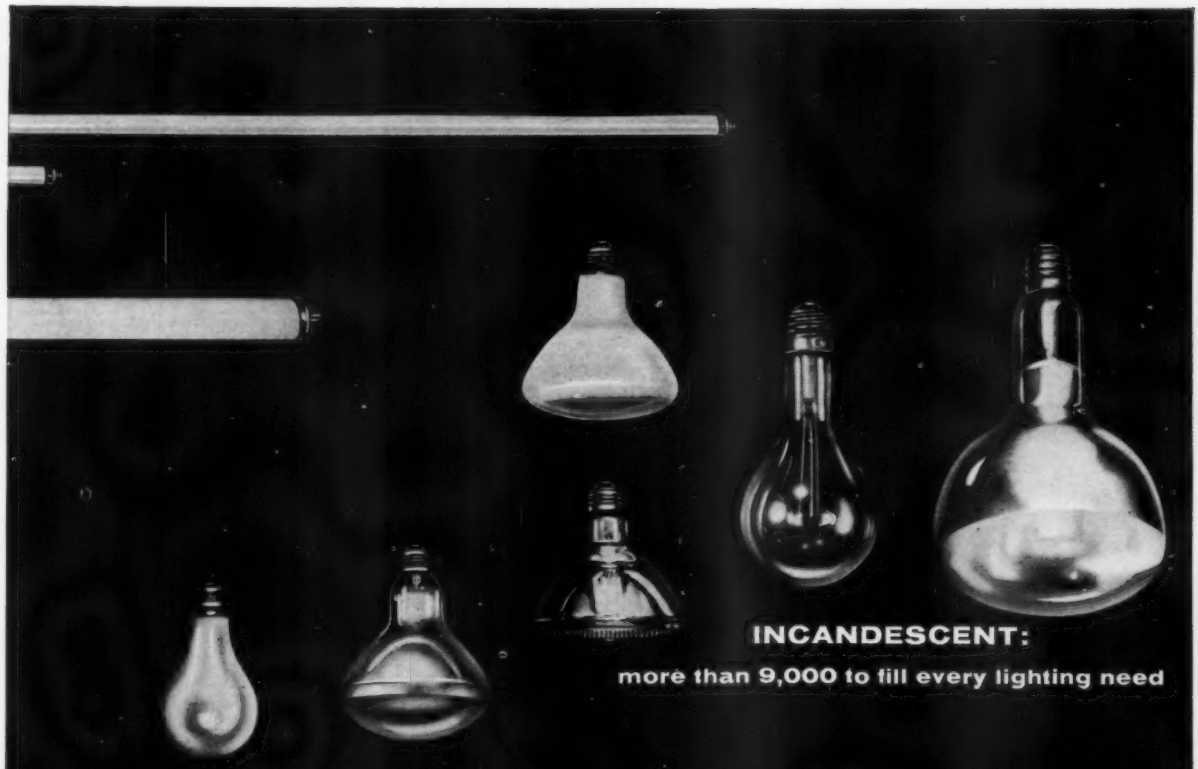
Westinghouse again demonstrates its leadership in lighting with lamps *Job-Tailored* to cut costs, reduce accidents, improve both "See-Ability" and morale. All this is possible because Westinghouse produces more than *10,000 kinds of lamps* with exclusive developments like those below which give you more for your lighting investment.

**Fluorescent Lamps,** for example, have a new high-intensity phosphor—*Ultralume*™—which gives more lumens per watt plus uniform end-to-end light for the life of the lamp.

**Mercury Lamps** with special "hard" glass *Weather Duty*™ construction. Can't be harmed by snow, rain, condensation—even without protective coverings.

**Incandescent Lamps** provide an extra measure of quality with exclusive *Lifeline Filament*™—made possible because only Westinghouse controls the manufacture of filaments from tungsten ore to finished wire.

**In addition, Job-Tailored lamps give you more light from existing fixtures.** By standardizing on bases, bulb sizes and light center lengths, Westinghouse provides a high degree of *lamp interchangeability*. As a result, with many Westinghouse lamps, you may increase light output to more efficient working and safety levels without changing fixtures.




# Tailored Lamps

**FREE WESTINGHOUSE JOB-TAILORED LIGHTING SURVEY SHOWS YOU HOW TO GET THE MOST FOR YOUR LIGHTING DOLLAR.** To enable you to spot places in your present lighting installations where incorrect lamps may be costing you money, call in a Westinghouse Lamp Representative. With your plant engineer or maintenance supervisor, he will inspect your lighting installation, make a careful analysis of his findings, and report his recommendations. To get this free service, simply fill out the coupon. You'll be dollars ahead with Westinghouse JOB-TAILORED lighting.

**YOU CAN BE SURE... IF IT'S**

**Westinghouse**

**WESTINGHOUSE ELECTRIC CORPORATION**
**LAMP DIVISION**
Industrial-Commercial Lighting Service
Bloomfield, New Jersey

Please have your Lamp Representative in my area make an appointment with our Mr. _____ to arrange a survey of our lighting needs.

**NAME** _____

**COMPANY** _____

**ADDRESS** _____

**CITY** _____ **ZONE** ____ **STATE** _____

**FULL NAME OF PLANT ENGINEER** _____

**PHONE NUMBER** _____

I am interested in ☐ incandescent ☐ fluorescent ☐ mercury lighting.

# OPERATION AND PRODUCTION pointers for the industrial plant engineer

*Edited by Vernon T. Kempf*

## Low Voltage Is Dangerous

WHEN THE POTENTIALITIES of low voltage shock are fully understood, it is surprising to learn how dangerous such a shock can be. To avoid the danger, it is necessary to be aware of the hazards, particularly around shops and work benches where low voltage tools and equipment are handled. Defective or improperly grounded tools are especially dangerous.

There are three main effects that electric shock may have on the human body, any one of which may cause death. First aid for all three is to apply artificial respiration. Electric shock may stop heart action, cause extensive burning or stop breathing. As little as one-tenth ampere may be fatal.

As described in the Bureau of Ships Journal, low voltage can also kill or injure indirectly. For example, just a slight shock may cause a person to move suddenly and become entangled in a machine or fall from a high place.

One of the factors that influences the severity of low voltage shock is the type of current. Five times more direct current than alternating current is needed to freeze a person to a wire. It is a common mistake to suppose that household alternating current is safer than direct current. Actually, the 60 cycle frequency on which alternating current is distributed is more dangerous to the human body.

The body resistance with the skin unbroken varies from 1000 to 500,000 ohms. Dry skin has higher resistance than wet skin, so that when the skin is dry less damage will result from electric shock. When the skin is wet, resistance is lowered. Also, breaks in the skin, such as cuts and burns, may lower the resistance to as little as 200 ohms. The skin is analogous to a sheet of insulation material.

The greater the number of vital organs through which the current passes, the greater the chance of death. For example, a charge passing from the right shoulder through the right hand will not have nearly as great an effect as a charge going from the right shoulder through the left foot. Experience has shown that about a tenth of the current going from the hand to the foot reaches the heart.

The ratio of the voltage to the body resistance is the factor that influences the amount of current that can pass through the body without harmful effect. If a person can instantly break free from the current, the shock may be too short in duration to do much damage. However, it is easy to freeze to a low voltage charge. When a live line is touched with the palm of the hand, the muscles tend to tighten, causing a person to freeze to the line.

(Continued on page 58)

## Save $36,000 Annually With Audio Timekeeping

PRODUCTION WORKERS at General Electric Metallurgical Products Department plant in Detroit are using a new time saving method of reporting job information to a central timekeeping department. When the employee arrives in the morning he leans over a call box at his work station and reports his presence, clock, job and operation number.

This information is transmitted into a central office and is immediately keypunched into a tabulating card. Later, when the worker finishes his first job, he again visits the call box and reports what he has accomplished, including details of the new job he is about to tackle. He repeats this procedure every time a work change occurs during the day. At the end of his shift, the central office automatically balances out his work for the day against his actual clock hours.

Up to the present time 28 call boxes have been located within the plant so that no box is more than 60 ft from any production worker. In the central office, three master stations make it possible for any call originating in the plant to be handled by one of the three operators without delay.

All the variable data is gathered on keypunched tabulating cards which are integrated with a master tabulating card. The latter contains pre-punched rates and job information and in effect presents a complete package to the machine accounting unit.

The system provides a faster flow of information to the accounting department and management and can spot machine downtime rapidly.

**Fig. 1. Call box provides instant communication of timekeeping, job status and production information to central office**

**Fig. 2. Information is received on master stations, along rear wall, and is keypunched into tabulating cards for use**

# QUICK! *"Call the Deluxe Dealer— we have a shelving problem!"*

Exaggerated picture? Sure . . . but any one of these shelving problems may be troubling you . . . sagging shelves, insufficient storage space, inflexible wooden shelving, poor layout. To cure your shelving problems, call your Deluxe steel shelving dealer. He will engineer efficient and flexible shelving installations, then supply you with additional shelving racks as fast as you need them! Deluxe dealers are backed by the finest-designed and sturdiest shelving made.

***These Deluxe features allow you to install Deluxe shelving at lowest cost.***

1. One-piece bin type uprights—for greater rigidity, faster erection.
2. Boltless adjustable shelf brackets—complete adjustability without tools.
3. Snap-in dividers—for quick flexibility.
4. Factory-embedded shelf reinforcing—to cut down installation time
5. Coped shelf corners increase storage capacity.

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**DELUXE METAL FURNITURE COMPANY · WARREN, PA.**
*A Division of the Royal Metal Manufacturing Company*

Look for your Deluxe dealer under *Shelving* in the yellow pages of your telephone directory or write to the factory for the name of the dealer nearest you and the colorful "Shelving Reference Manual."

**For more facts circle 537 on Reply Card**

# OPERATION—PRODUCTION

(O and P begins on page 56)

The amount of current that freezes the average normal person to an object is about 12.4 ma. When the hands are wet, less than 20 v is required to cause freezing.

Because the heart of a healthy person is stronger and will take more abuse, the healthy person has a better chance of survival than one with a weak heart. Unfortunately, a person cannot stand much electric current without injury. The minimum amount of current that will cause him to let go and not be hurt is one milliampere.

Electric equipment, properly used, is not dangerous, but all who have anything to do with it must think of their own safety and that of their fellow workers and take normal precautions to avoid hazards from electric shock.

## Foam Control

"BEFORE AND AFTER" photos, taken just two minutes apart, demonstrate the success of antifoam agents in knocking down foam at the Upjohn Company waste treatment plant at Kalamazoo, Mich. Reaching heights of six feet or more, the foam would spill out over the sides of the aeration tanks, completely covering the catwalks and creating dangerous conditions for men working around the tanks. Application of antifoam at periodic intervals prevents the foaming.

**Fig. 1. Slippery foam surging over aeration tank before using antifoam agent**

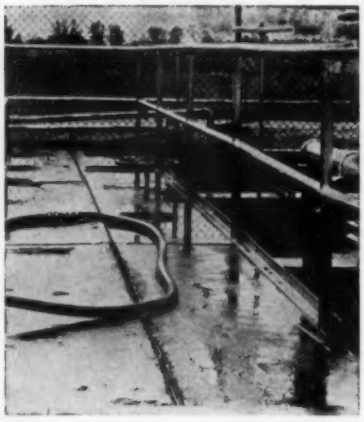


**Fig. 2. Complete elimination of all foam is accomplished in two minutes**

Using ten parts per million of Hodag S-118 provides effective foam control. This amounts to an average cost of approximately $1.00 per day, or one cent per 1000 gal of waste processed.

The liquid antifoam is piped directly from its shipping drum to the suction side of a pump, and is mixed with the effluent. This operation is controlled by a timing device which operates a solenoid valve. The mixture flows through a pipe extending alongside the aeration tanks. Set in this pipe at regular intervals are deflector nozzles which shoot a fine spray of the antifoam mixture into the tanks, effectively preventing the build-up foam.

The antifoam, supplied by Hodag Chemical Corp., Chicago, is dark amber in color, weighs 7.4 lb per gallon, and can be applied manually as well as automatically. It is non-corrosive and can be used with iron equipment.

## Pushbutton Order Filling

MECHANIZED ORDER FILLING speeds up customers orders at Gallo Sales Co., California. The system consists of a bank of 66 gravity roller conveyor storage lines in a three deck arrangement, on which are stored cases of various commodities, one commodity to a line.

At the lower end of each line is an escapement which will allow one case at a time to flow onto a belt conveyor at right angles to the gravity conveyor There are three belt conveyors, one for each deck or layer of roller conveyors.

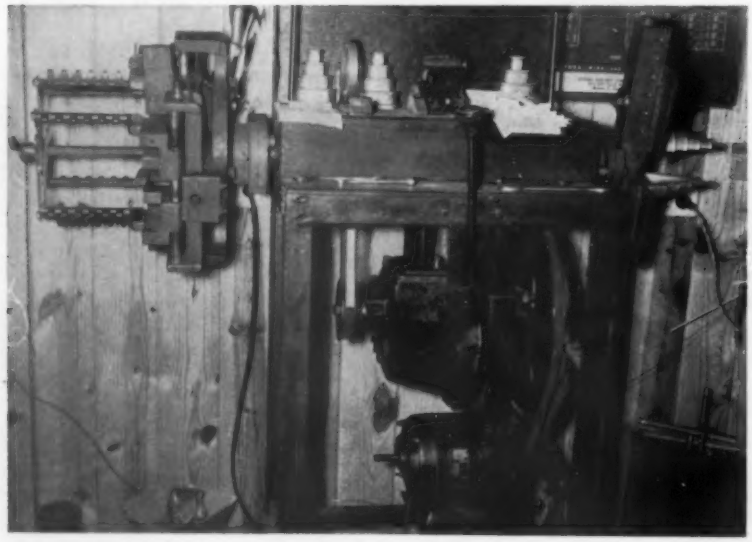
These three belt conveyors converge vertically and discharge onto a wide chain-driven live roller conveyor. The wide conveyor converges the flow horizontally so that the final result is a single conveyor line flowing to the route trucks.

The whole system is controlled by an operator at a control console who makes up orders of various commodities. This is accomplished by means of two banks of switches, one for the quantity and the other for the variety desired. By operating one bank of switches with each hand, he can quickly put an order into the control panel.

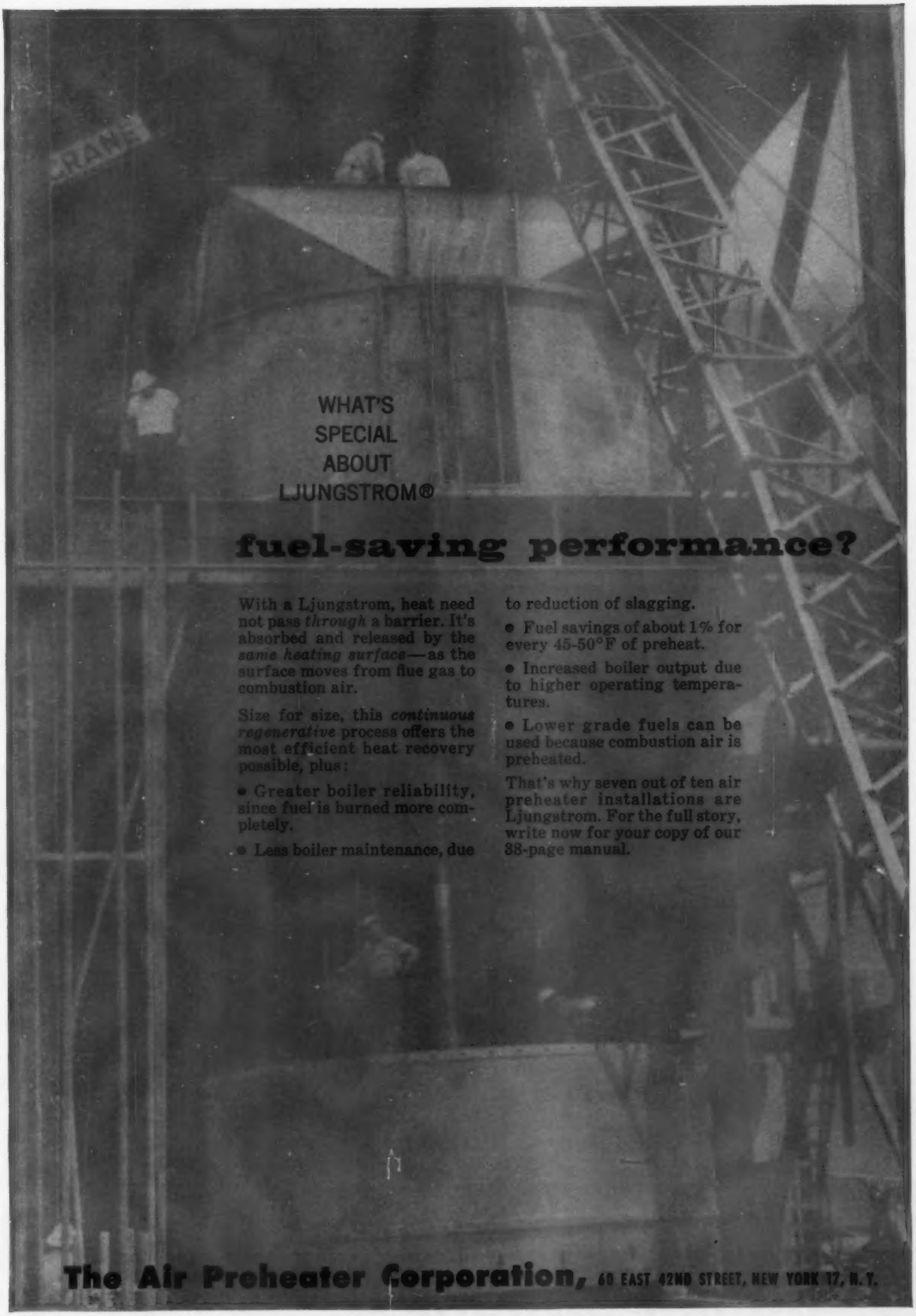
When he has completed putting the order into the panel, the operator

## Three-Speed Coil Winder Is Shop Assembled

**Contributed by Harry J. Miller**



**A ½-hp motor is V-belted to a rebuilt truck transmission to provide 3 forward winding speeds. Spring loaded block of brake lining beneath the large driven wheel acts as a brake. Pressing the treadle releases brake, operates an auto starter to start the motor. Standard coil-winding forms complete the machine**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That's why seven out of ten air preheater installations are Ljungstrom. For the full story, write now for your copy of our 38-page manual.
The Air Preheater Corporation, 60 EAST 42ND STREET, NEW YORK 17, N.Y.

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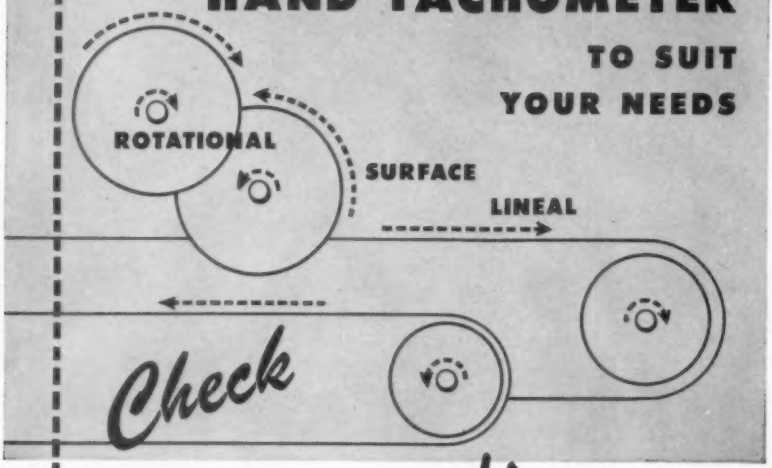


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For more facts circle 539 on Reply Card


# OPERATION—PRODUCTION

(O and P begins on page 56)

presses another button which causes the cases to be counted out of the storage lines automatically. While this is taking place, the operator can be setting the next order into the panel.

The system contains approximately

**Fig. 1. Operator, with clear view of entire operation, sets up orders on panel and controls all the stock movements**

**Fig. 2. Cases from three levels are first converged vertically and then horizontally into a single line going to trucks**

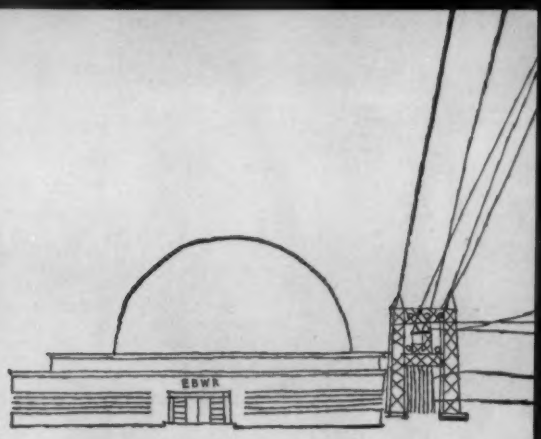
5000 ft of Mathews conveyor, and stores approximately 4000 cases. Average orders of approximately eight cases are handled at the rate of 1000 cases per hour.

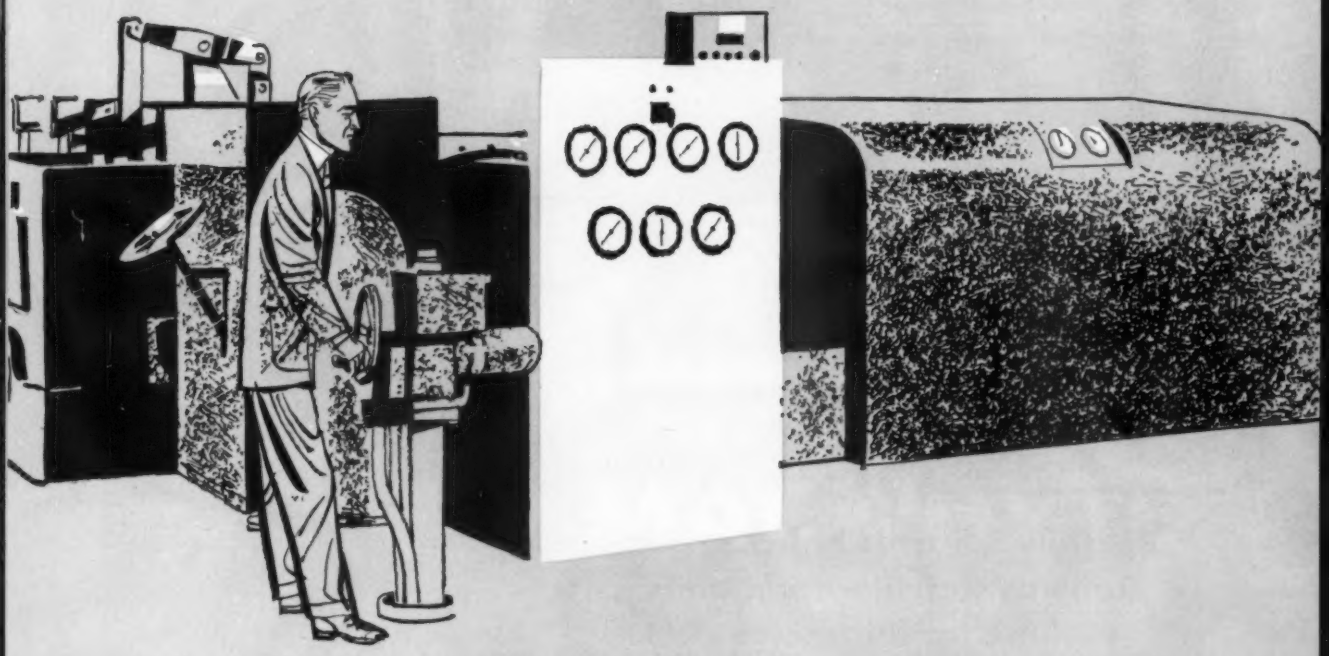
The upper ends of the gravity storage lines are loaded by a crew of four men, who take the cases from pallet loads and put them into the proper storage conveyor.

## Compressor Mounted High in Air

PROTECTED FROM DAMAGE by the heavy steel being moved about the working area, the High Welding Co., Lancaster, Pa., mounted a 25 hp

# STANDARD OIL PRODUCT HAS ROLE IN HISTORY-MAKING EVENT



Last December at Argonne National Laboratory, Lemont, Illinois, the Experimental Boiling Water Reactor achieved its design power level of 5,000 kw. for the first time. The lubricating oil in the Allis-Chalmers turbine was Standard's NONPAREIL Turbine Oil.

In a boiling water reactor, live steam is generated in the uranium core and piped to the turbine. There is no coal pile on the site and no ash heap. The reactor consumes less than an ounce of uranium in 24 hours. While the unit is regarded as a tool for research, it is now supplying an important part of the electrical energy required by this 2,700 man laboratory.

Near the turbine of this history-making research tool will hang a framed guarantee certificate. This document will certify that the 350 gallon fill of NONPAREIL Turbine Oil is *guaranteed for the life of the turbine.* More than 1,800 of these certificates have been issued; the first one more than 30 years ago. The guarantee still stands.

As with every NONPAREIL Turbine Oil installation, an additional technical service is performed. Standard Oil men with engineering training and long experience in lubrication work take samples of the oil for analysis twice yearly to make sure the oil continues to meet guarantee conditions. In the case of Argonne National Laboratory, industrial lubrication specialists from Standard Oil's division office in Joliet, only a few miles away, do this work.

Such service as this is available to you from your nearby Standard Oil office anywhere in the 15 Midwest and Rocky Mountain states. Call there. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD

**STANDARD OIL COMPANY**
(Indiana)

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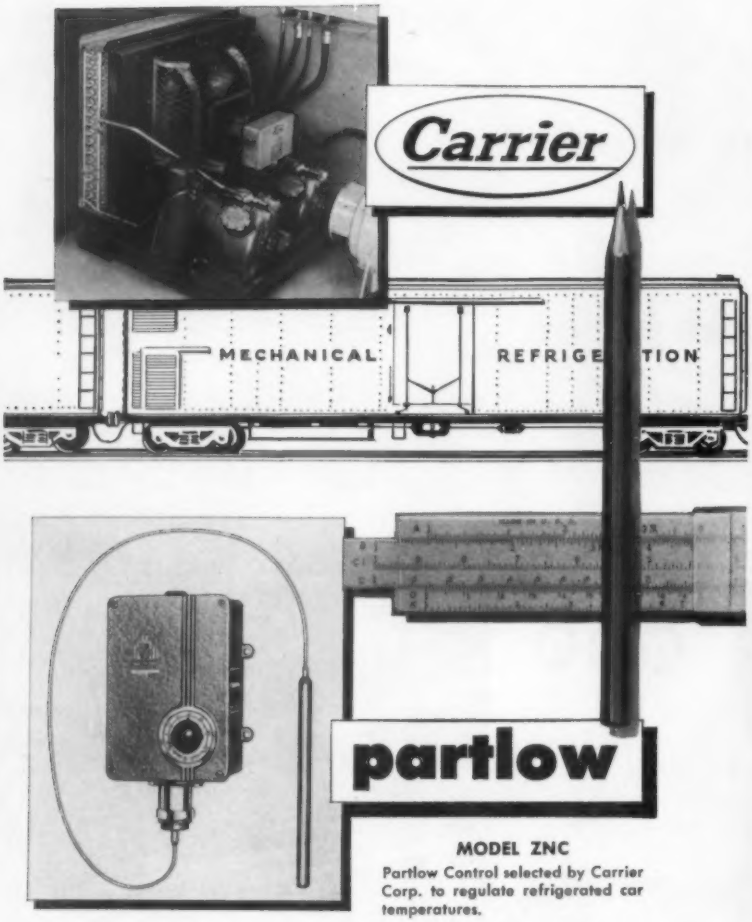


MODEL ZNC

Partlow Control selected by Carrier Corp. to regulate refrigerated car temperatures.

## Partlow Controls help Carrier Railway Refrigeration Units "think for themselves"

Carrier Railway Refrigeration Units that "think for themselves" are setting a new standard for positive, controlled temperature in rail transportation of frozen foods. *And Partlow Controls call the signals that keep temperatures on the button!*

The Carrier systems are designed to heat as well as cool, providing a constant temperature despite the various climate changes encountered in transcontinental runs. A car temperature range from –10°F to 70°F is possible, depending on the Partlow Control setting.

What's *your* temperature control problem? Tell it to Partlow! There's a Partlow Control to fit your requirements . . . in the range from –30°F to 1200°F. For use with gas, oil, steam or water valves; or electrical equipment.

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# OPERATION—PRODUCTION

(O and P begins on page 56)

Schramm air compressor 20 ft in the air. The unit supplies 125 cfm of compressed air to run grinders and chipping hammers.

The company welded brackets on a

**Brackets welded to building column support compressor 20 ft in the air**

column supporting their plant roof and placed the compressor in the elevated position. A ring above the compressor on the building structure permits raising and lowering with a chain hoist for maintenance at ground level. The elevated position saved about 20 sq ft of valuable floor space.

## Dust Control

SCRUBBERS on three rotary lime kilns at Niagara Falls rounded out a major air pollution abatement program by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation.

The Pease-Anthony scrubbers, 12 ft in diameter and 33 ft high, have 22 sets of water spray nozzles. Dust laden gases from the kilns are passed up through the sprays of water in a rotary motion. The dust collects in the form of sludge and is transferred to large pumps and out to a settling basin.

Each of the scrubbers is designed to handle 29,000 cubic feet of gas per minute and are tied into each other so as to allow shutdown of any one for maintenance and still operate at top efficiency with the other two. Total connected load for pumps, fans and auxiliary equipment is 550 hp and



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# THIS METHOD BEATS HAND BOLTING 35 TO 10

## . . . as Westinghouse speeds insulator packaging with Snap-on impact wrench

Clark Moore, *Snap-on* sales engineer, and Westinghouse manufacturing engineers developed the use of this electric impact wrench on the new packing line for crating apparatus insulators at the Westinghouse Electric Corporation plant at Derry, Pa. The impact wrench has speeded the operation by tightening 35 bolts in the time required to tighten 10 by hand. Officials of Westinghouse state that this *Snap-on* tool pays for itself every ninety days in time saved.

This is another example of how the combination of a *Snap-on* sales engineer's training and experience, plus special *Snap-on* tool equipment, helped a manufacturer save money. If you have a tool problem, get in touch with the nearest *Snap-on* branch or write us. We will arrange to have our representative call on you and render all possible assistance.

*Snap-on is the trademark of Snap-on Tools Corporation.

**SNAP-ON TOOLS CORPORATION**
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For more facts circle 543 on Reply Card


# OPERATION—PRODUCTION

(O and P begins on page 56)

**Fig. 1. Before: Dust laden gases from the kilns are carried high in the air**

**Fig. 2. After: Scrubber installation effectively removes dust from kilns**

water is circulated at the rate of 1150 gpm. The dust laden gases enter the scrubber at a temperature of 1350 F and clean gas is discharged at 450 F. The scrubbers and inlet flues are lined with firebrick to withstand these temperatures. One special feature in use is a 10-in. rubber hose at the discharge of the sludge pumps to keep solids from building up in the line.

## Wire Shipped Without Reels Saves Space, Shipping Costs

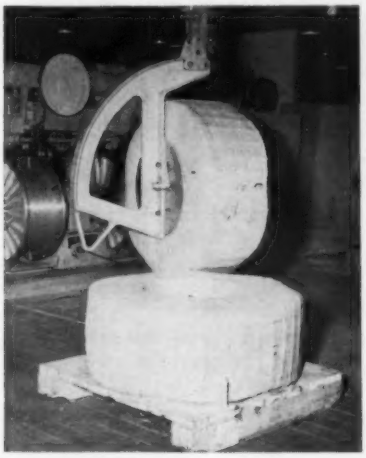
HEAVY STEEL REELS of wire are beginning to disappear at U. S. Steel's American Steel and Wire Division's Waukegan Works. Instead of coiling wire around steel reels it is being wound on a core of pressed paper.

Wire is coiled onto an adapter reel which can be taken apart after the wire is wound on the paper core. The wire is then secured to the core with flat steel strapping. After strapping, the adapter reel sides are removed, leaving a 1000-lb packaged coil, which is then

wrapped with asphalt-center paper for protection in shipment.

Coils are then handled by a lifting device with an expandable cylinder. The lift cylinder is placed inside the paper core and its rubberized covering is inflated with compressed air. The lift head expands and holds the coil tightly. The trolley and curved rail of the lifting device permit up-ending coils to lay them flat on the pallets.

Two 1000-lb coils are strapped on each pallet. The only extra weight is the paper core, wrapping and wooden pallet. The old reels weighed 120 lb each and the shipping weight of the wire averaged 750 lb.



**Paper-wrapped coils wound on paper core eliminate shipping heavy steel reels**

Shipping space, transportation costs, and the expense of returning empty steel reels are saved by this packaging procedure. The coil will also allow longer running time on the customer's machine because of the extra amount of wire in each coil.

The coils can be easily stored and handled by means of a fork lift truck.

## Time Clock on Metallizing

**Contributed by Stanley Clark**

SINCE PLANT bookkeeping requires an accounting of every minute our guns are used in metallizing, it was a problem to have operators state accurately the number of minutes consumed on each job. In our plant an interval timer solved the problem.

A bellows diaphragm inserted in the air line controls the clock. When the metallizing gun is triggered, air pressure in the line falls and actuates a diaphragm-operated lever which starts the clock.

When the gun is shut off, increased pressure actuates the diaphragm to stop the clock. The actual minutes of use are totaled by the clock's reading.

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These men are doing a job that won't have to be re-done for a good many years. The aluminum paint they're putting on is actually a tough *shield* that will stand up against rust and corrosion, and won't need attention for years.

A quality brand of aluminum paint applied as the manufacturer recommends assures extra years of protection. Often one coat will do the job.

Inside your plant or outside, paint made with Reynolds Aluminum Pigment can save metal or masonry from deterioration, cut maintenance. Also use it to give your plant the modern look of aluminum.

Aluminum paint reflects heat, keeps the buildings cooler in summer, slows evaporation of volatiles and reduces metal expansion. And it reflects light to make interiors brighter, more attractive. Use aluminum paint, the modern finish, to keep your plant looking new. For more complete information write for the literature listed below.

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Built-up or metal roofs last longer, resist rust, keep buildings cooler when coated with asphalt-aluminum roof paints or coatings. The best of these roof coatings have this Warranty Seal, guaranteeing an approved vehicle and at least two pounds of pure aluminum pigment per gallon.

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# GENERAL ELECTRIC LIMITAMP* STARTERS OFFER

# MAXIMUM PROTECTION FOR PERSONNEL AND EQUIPMENT

Maximum personnel and equipment protection is a built-in characteristic of General Electric's Limitamp starter. Here are the protective benefits offered by Limitamp control:

**For operating personnel**—High-voltage compartments cannot be entered until the starter is isolated from the power source. This is done by a gang-operated isolating switch that is actuated by the top-compartment door handle.

**For maintenance personnel**—The gang-operated switch isolates the starter and its load, and provides a visible check to assure personnel that there is no high-voltage power to accessible components.

**For equipment**—The isolating switch is mechanically interlocked with the contactor to assure load is removed from starter before switch is operated. The completely co-ordinated electrical design of Limitamp provides optimum equipment protection.

*Reg. Trade-mark of General Electric Company.

## MORE LIMITAMP CONTROL FEATURES

Personnel and equipment protection is but one benefit. There are many more. For instance:

- Flexible arrangement of units and space savings because all connections are made from front.
- Extra five-square-foot space savings on large motor applications by using higher-capacity fuses to eliminate need for extra fuse cabinet.
- Easy installation made possible with roll-out contactor unit and front-connected devices.

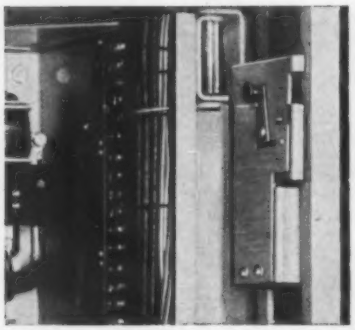
## REALIZE THESE BENEFITS NOW

Don't be satisfied with "old-fashioned" high-voltage motor control: Specify General Electric's Limitamp control—*leader in design and performance.* Contact your G-E Apparatus Sales Office today, or write for Bulletin GEA-6331, to Section 783-4, General Electric Co., Schenectady, N. Y.

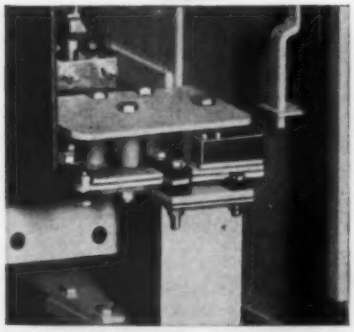
*Industry Control Department, Roanoke, Virginia.*

*Progress Is Our Most Important Product*

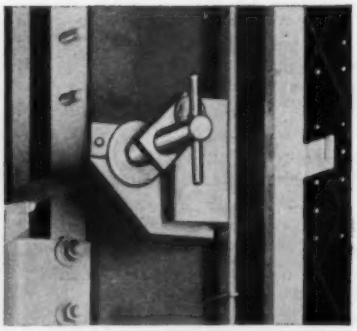
GENERAL ELECTRIC



1 **ELECTRO-MECHANICAL INTERLOCK** assures that load is completely removed before the isolating switch can be operated.

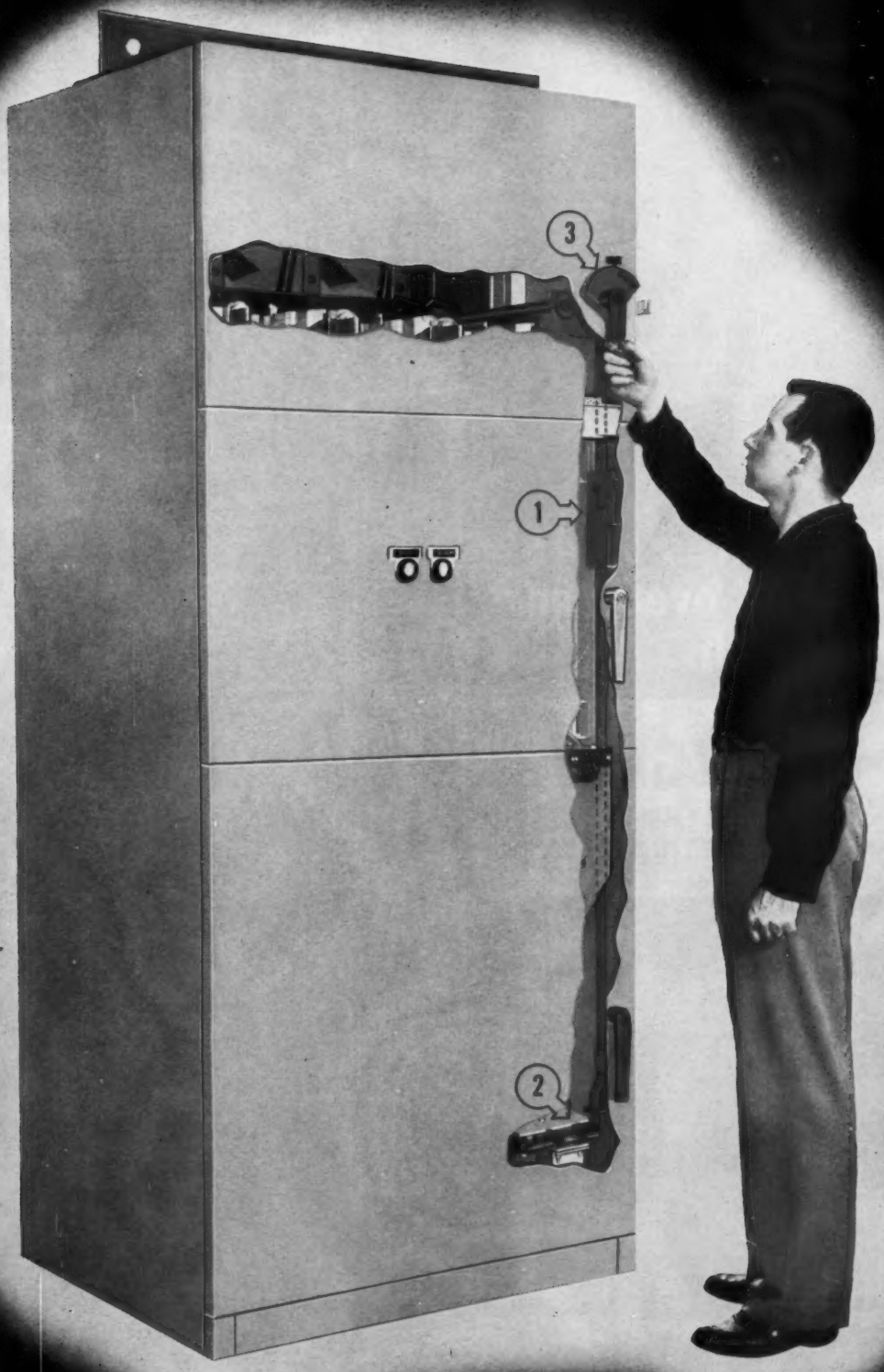


2 **INTERFERENCE INTERLOCK** prevents opening isolating switch under load, opening high-voltage compartments until unit is isolated.



3 **ISOLATING SWITCH,** operated from outside the enclosure, isolates the accessible high-voltage components from the power source.

...LEADER IN DESIGN AND PERFORMANCE



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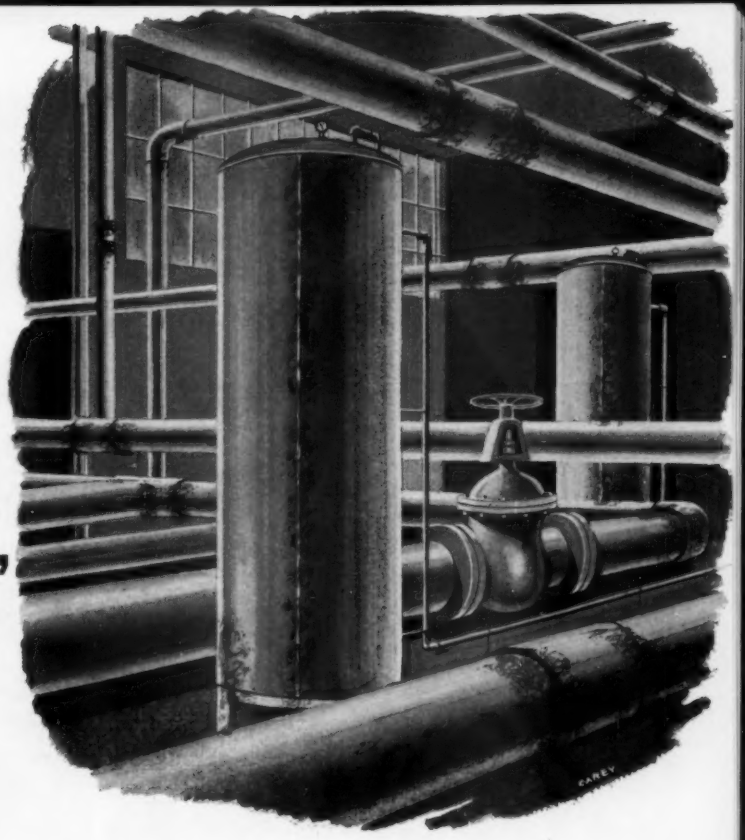
**usually begin with**

# "TROUBLE SPOTS"



## *Investigate the special properties of*

## Copon®

**Severe corrosion problems solved with COPON include...**

- Internal or external protection of pipes, tanks and vessels from solvents such as Aliphatic or Aromatic Hydrocarbons, Ketones, Esters and Alcohols.
- External protection of pipes, tanks and structures from heat, high humidity and chemical fumes.
- Protection of cooling tower headers, air washers and heat exchangers.
- Protection of production equipment from the severe corrosive action of cutting coolants.

COPON coatings provide superior protection for seams, welds, sharp edges and other corrosion "trouble spots." They provide higher film build-up per coat and cling tenaciously to metals and alloys. They last longer, because Copon remains tough and elastic even when subjected to chemical fumes, heat and high humidity. And they are less likely to be mechanically damaged, because Copon offers greater abrasion resistance than most protective coatings.

Easily applied by brushing or spraying, there is a selection of Copon coatings designed to solve or prevent severe corrosion problems. They have been used successfully to protect offshore drilling rigs, internally coat new and used pipelines, stop corrosion losses in chemical plants and paper mills, and in many other installations where corrosion costs were skyrocketing.

Copon®

FOR CORROSION CONTROL

*For complete information on Copon, write on your company letterhead to the manufacturer located nearest your city.*

ALLIED PAINT MFG. COMPANY
P. O. Box 1088, Tulsa, Okla.

BENNETT'S.
65 W. First South St.,
Salt Lake City 10, Utah

WALTER N. BOYSEN CO.
42nd & Linden Sts., Oakland 8, Calif.
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BRITISH AMERICA PAINT CO., LTD.
P. O. Box 70, Victoria, B. C., Canada

BROOKLYN PAINT & VARNISH CO., INC.
50 Jay Street, Brooklyn 1, N. Y.

COAST PAINT & LACQUER CO.
P. O. Box 1113, Houston 1, Texas

ENTERPRISE PAINT MANUFACTURING CO
2841 S. Ashland Ave., Chicago 8, Ill.

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Birmingham 5, Ala.

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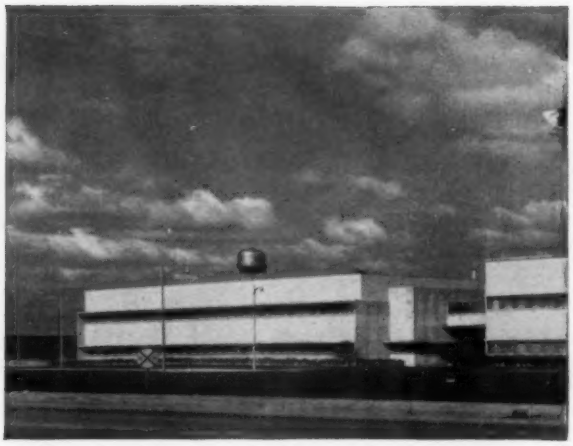
McDOUGALL-BUTLER CO., INC.
2929 Main St., Buffalo 14, New York

JAMES B. SIPE and COMPANY, INC.
P. O. Box 8010, Pittsburgh 16, Pa.

**For more facts circle 547 on Reply Card**

# Pneumatic Control System Adds to Plant Efficiency at A·B·DICK COMPANY...



Accurate control of temperatures and humidities is required throughout the 715,000 sq. ft. plant of A. B. Dick Company, the nation's largest exclusive maker of duplicating equipment and supplies. The multi-building plant has a wide variety of control needs, all of which are met by a specially engineered Johnson Pneumatic Control System.

In the air conditioned web process section, for example, stencils wrinkle if humidity is too high, won't coat properly if too low. Extremes of heat, cold and humidity as well as constant temperature and humidity conditions are produced in connection with the company's extensive research and testing programs. In the general manufacturing and assembly area, the system operates 47 ceiling-mounted heating and ventilating units. The explosion-proof features of pneumatic control are essential in areas where ether, alcohol and other hazardous materials are used. And, of course, there's the provision of air conditioned comfort for the administrative, sales and technical staffs.

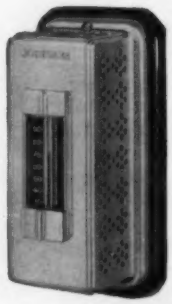
This close control of temperatures and humidities simplifies A. B. Dick Company's material handling and processing problems, helps assure high speed, quality production and improves worker efficiency.

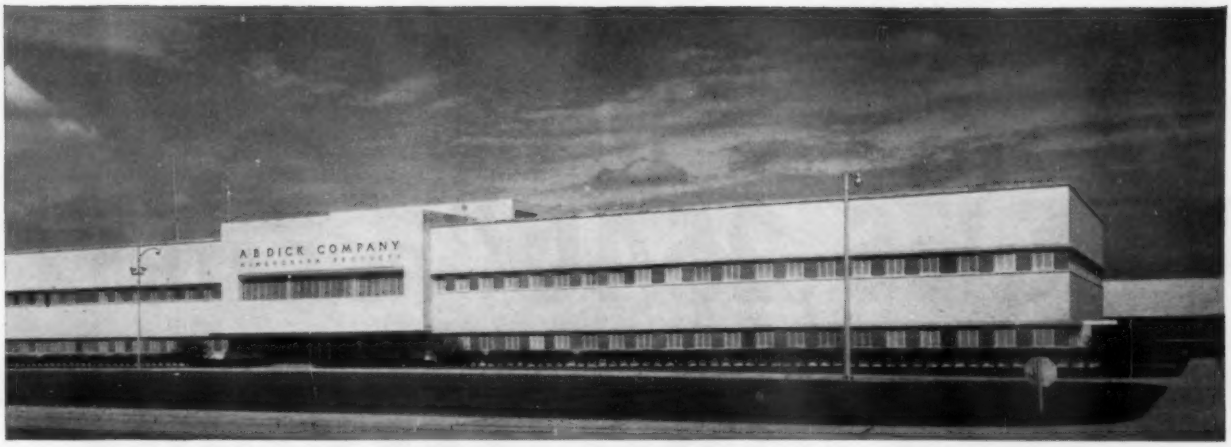
Let Johnson help you enjoy similar benefits. Johnson Pneumatic Control Systems offer a combination of advantages unmatched by any other method of control . . . widest flexibility, high accuracy, fewer components and easier, less costly operation. A nearby Johnson engineer has all the facts. Johnson Service Company, Milwaukee 1, Wisconsin.

**JOHNSON CONTROL**

**PNEUMATIC SYSTEMS**

**DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885**






*A. B. Dick Company, Chicago. Main Office and Plant designed and built by The Austin Company. For the West Office Building, Ragnar Benson, Inc., Chicago, engineers and builders, and Robert E. Hattis, Chicago, consulting engineer.*

In the main test section, A. B. Dick products are subjected to continuous, exhaustive tests. The Johnson System maintains a constant condition of 72 F and 50 per cent relative humidity. In the isolated dry room, left, and hot-humid room, right, special tests are conducted under extremely adverse conditions. In this section, temperature variations are limited to ± ½ F and humidity to ± 2 per cent.

Equally close control is maintained in the chemical research laboratory where chemists and technicians work to develop new and better inks and paper coatings for use with A. B. Dick duplicating equipment. Comfortably air conditioned buildings such as this are a big asset in attracting high grade personnel and reducing employee turnover rates.

As with every progressive manufacturer, the development of new products never ceases. Below is a section of the A. B. Dick Company model shop in which new products are hand-made for testing under varied operational conditions. Here, as in many other areas of the building, there is complete year 'round air conditioned comfort.

Behind the scenes, Johnson controllers operate the central fan systems serving the many air conditioned zones of the building. Process hot water, perimeter radiation, process refrigeration and process condensing water are also Johnson controlled. Pressure gauges, exclusive with pneumatic systems, simplify operation.

**For more facts circle 548 on Reply Card**

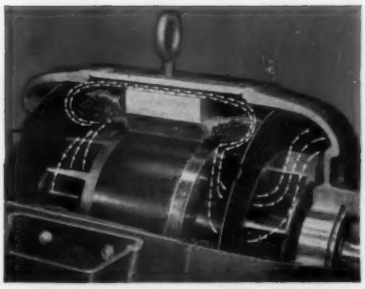
# NEW ROBBINS "SERIES 254U" RE-RATED FIVE BIG

**FULL HEIGHT END HEAD PROTECTION**
One piece shrouded end heads give full height protection against moisture and falling objects. Internal baffles complete splash-proof construction.

# & MYERS

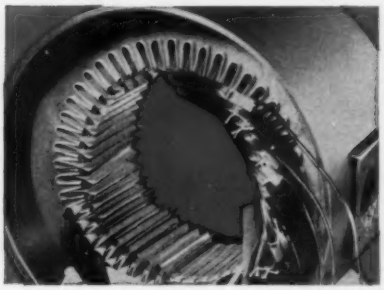
# MOTORS offer you...

# ADVANTAGES!



**"STRAIGHT THROUGH" DUAL-SWEEP VENTILATION ELIMINATES "HOT SPOTS"**

Tandem fans, one pushing and the other pulling, produce washing action around and over field coil ends, insure lower internal temperatures and longer dependable operation.



**MYLAR* INSULATION INCREASES MOTOR LIFE.** Mylar*, laminated to rag paper insures positive insulation and assures virtually permanent protection because of its excellent dielectric qualities. In addition, the rag paper backing provides a cushioning effect for added resistance to abrasions and punctures.

*DuPont registered trademark.

**BEARINGS EASILY INSPECTED**

Removable cover plate at each end of head permits easy bearing inspection without dismantling motor. Bearings run in double-width races, thus have extra-large reservoirs containing grease selected to resist dust, temperature, humidity and high operating speeds.

**PERMANENTLY NUMBERED LEADS SIMPLIFY INSTALLATION AND MAINTENANCE**

Proper lead identification is assured even after years of exposure. Numbers are permanently impregnated into the sub-surface of the insulation . . . can't wear off or deteriorate.

THESE five big advantages make R&M's "Series 254U" re-rated motors your best buy for applications requiring dependable, full-time performance. They can be installed in any environment, outdoors without a cover or in damp and corrosive atmospheres. Moisture, rust or corrosion can't affect their operation, and they take rugged duty in stride! Every R&M motor is electrically and mechanically designed to withstand the most severe operating conditions. Careful quality control and precision manufacture insure top performance and dependability year after year. Write today, for R&M Bulletin 520PEon R&M's "Series 254U" re-rated motors!

**ROBBINS & MYERS, INC.**

SPRINGFIELD, OHIO / BRANTFORD, ONTARIO

**For more facts circle 549 on Reply Card**

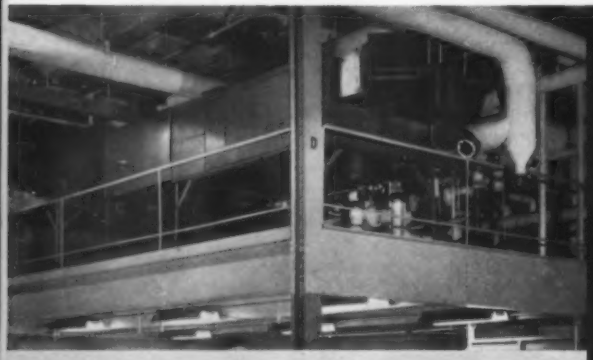


**For more facts circle 550 on Reply Card** →

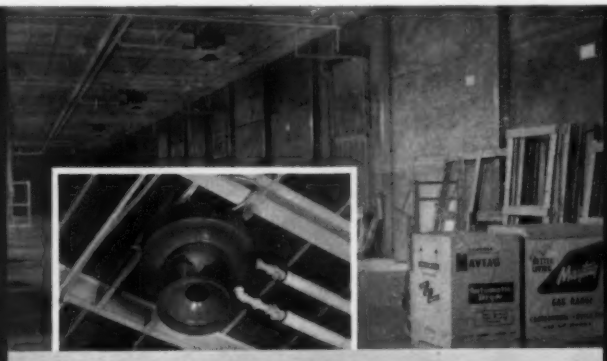
HERE, FOUR HERMAN NELSON HEATING AND VENTILATING UNITS assure ample space heat in the large warehouse at the Newton, Iowa, plant . . . one of several such "cluster" arrangements. Suspended from the ceiling, the units hang out of the way, save valuable space, provide quiet operation. Herman Nelson units of this type are available in heat capacities to one million BTU's.

# Easy-to-service **HERMAN NELSON** equipment solves many heating, exhausting and ventilating problems at **MAYTAG'S** Iowa plants

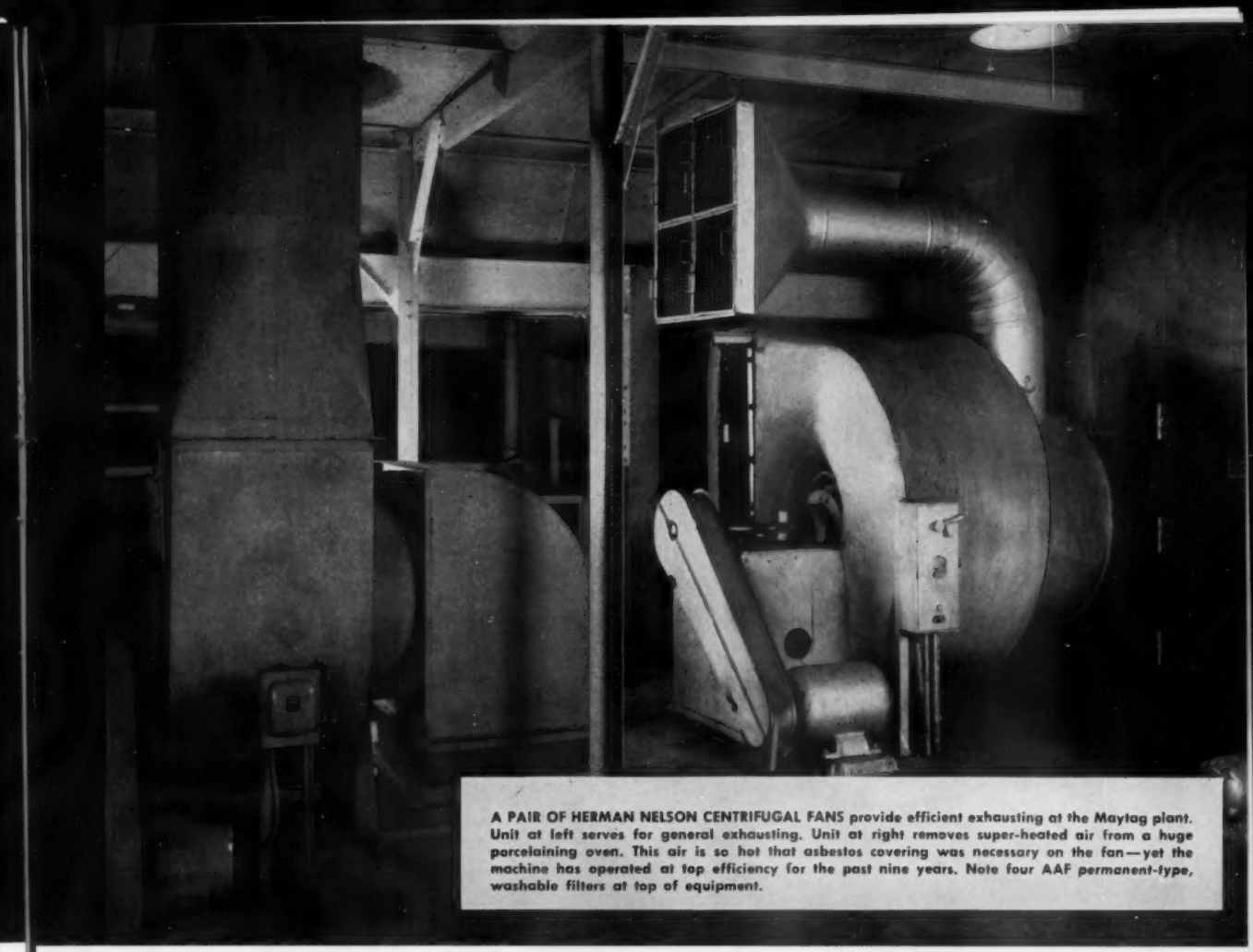
Architects & Engineers—Brooks-Borg, Des Moines; Mech. Contractor—M. A. Wolin Plumbing & Heating, Des Moines; Gen. Contractor—Weitz Co., Des Moines. Fans engineered and installed by R. C. Mahon Co., Detroit.



TWO OTHER HERMAN NELSON HEATING AND VENTILATING UNITS provide abundant space heat for a service repair area. Here, units are located out of the way on a balcony. They can be installed on wall, ceiling or floor—with or without ducts. Fan sections are completely rotatable.



A BATTERY OF HERMAN NELSON VERTICAL UNIT HEATERS discharge warm air vertically downward or at an angle in various directions. Warehouse is heated comfortably, without drafts. Note location of the heaters high on the ceiling, out of the way. Insert shows Unit Heater detail.



A PAIR OF HERMAN NELSON CENTRIFUGAL FANS provide efficient exhausting at the Maytag plant. Unit at left serves for general exhausting. Unit at right removes super-heated air from a huge porcelaining oven. This air is so hot that asbestos covering was necessary on the fan—yet the machine has operated at top efficiency for the past nine years. Note four AAF *permanent-type*, washable filters at top of equipment.

**Recently, Maytag's 10-millionth washer** rolled off the production lines, as this independent home laundry appliance manufacturer set a production record unequaled in the industry. To reach this kind of record, Maytag plants must operate smoothly, efficiently. Dependable heating and ventilating is mighty important to help maintain these production schedules. Men *and* machines must operate efficiently, too.

Selection of Herman Nelson equipment for Maytag's automatic washer and dryer plant at Newton, Iowa, is another example of the confidence large manufacturers have in Herman Nelson. Years of trouble-free service are assured. If yours is a problem requiring better air, you can *depend upon* the quality, performance and efficiency of this *complete* line of air handling equipment. Tell us your needs. Our nation-wide sales and service organization is ready to help.

**"Better Air Is Our Business!"**

HERMAN NELSON CENTRIFUGAL FANS here handle other exhausting problems in the plant. These fans are available in either slow-speed or non-overloading types; 17 wheel diameters from 12¼" to 73"; 8 arrangements for direct or belt drive.

AAF herman nelson

**American Air Filter**

Company, Inc.

215 Central Avenue • Louisville 8, Ky.

Otis **freight elevator**

"ENGINEERED SERVICE BY THE MAKER"

## Only Otis Maintenance offers these advantages to owners of Otis Freight Elevators

- ☑ "Engineered Service" by the maker maintains the original efficiency of the installation and assures peak performance at all times.
- ☑ Services of factory-and-field trained men with a knowledge of elevatoring that can't be matched.
- ☑ Availability of original or improved replacement parts for every installation, regardless of its age.
- ☑ Freedom from unexpected, expensive repair bills. There's just one fixed monthly charge. It can be budgeted. It's adjusted annually, up or down, on labor and material costs only. Never because of the age or condition of the equipment.

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N. Y.

# How Johnson & Johnson babies 18 freight and passenger elevators

**FERD DENHARD**
Buildings and Grounds Superintendent
JOHNSON & JOHNSON

"We're tremendously interested in the safe operation and efficient performance of 16 OTIS Freight Elevators and 2 OTIS Passenger Elevators in our New Jersey plants," says FERD DENHARD, Buildings and Grounds Superintendent of JOHNSON & JOHNSON. "That's why they're 100% under OTIS Maintenance specialists.

"And it's easy to understand why. For one thing, OTIS Maintenance gives us the guarantee of the maker's high standards of safety through the constant checking and replacing of parts in advance of their breakdown point. Further, original OTIS parts, or improved replacement parts, are always available regardless of the age of the equipment. This is important to us because our installation dates extend back to 1912.

"We also feel that the successful maintenance of the original efficiency of an elevator installation depends upon the proper replacement and testing of worn parts in order to assure peak performance at all times. This again is a service best supplied by the maker of the equipment because of its importance in extending the life of the equipment indefinitely."

## maintenance that keeps freight elevators running like new

- ☑ **Guarantee of the maker's high standards of safety through the constant checking and replacing of parts in advance of their breakdown point.**
- ☑ **Elimination of all guesswork in testing and repairing by using specially designed tools and electronic equipment to minimize shutdowns.**
- ☑ **Systematic upkeep and replacement of parts extend the life of an installation indefinitely.**
- ☑ **The value of a maker's pride. A perfectly performing Otis installation is Otis' best salesman. That's why we're never satisfied with anything less than peak performance at all times.**

This 4,000-pound gas truck has a low center of gravity that gives it good stability despite its short length.

• • •

**The Baker-Raulang Company, maker of Gas and Electric Trucks, is a subsidiary of the Otis Elevator Company.**

Baker®
industrial trucks

OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

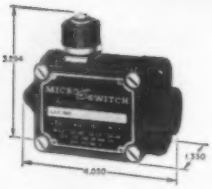
**For more facts circle 551 on Reply Card**

# MICRO SWITCH . . . FIRST IN PRECISION SWITCHING

How to cut processing costs by making plant equipment MORE AUTOMATIC . . . MORE PRODUCTIVE

Write for Catalog 83 on "Industrial Enclosed Switches"

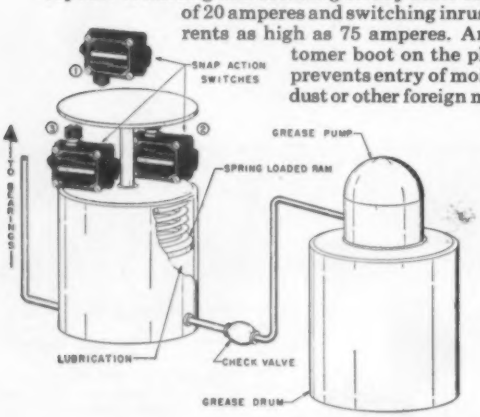
*Here are some important uses plant operating men find for MICRO SWITCH Precision Switches as keys to automatic plant controls*

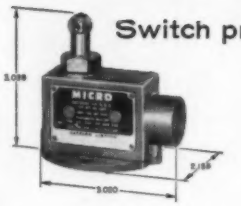


## Three switches keep motor bearings oiled on large mixing machine

As grease is forced out of the lubricator, the disc on the extended portion of the piston rod actuates Switch 2. This energizes a pump relay, pumping grease into the lubricator. When this is full, the disc actuates Switch 1 which stops the pump. Switch 3 is set lower than Switch 2. If the pump fails to start, the disc descends until it hits Switch 3 which sets off an alarm.

This MICRO SWITCH Type F is a high-capacity switch capable of making and breaking steady state currents of 20 amperes and switching inrush currents as high as 75 amperes. An elastomer boot on the plunger prevents entry of moisture, dust or other foreign matter.

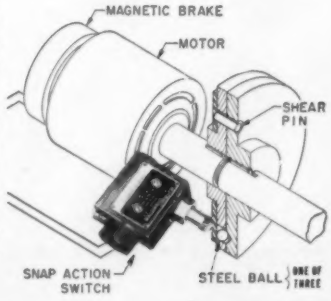



## Switch protects against damage if shaft binds or jams

A plant engineer installed this roller-plunger switch on a shear pin coupling to prevent serious mechanical damage should the driven shaft bind or jam. Three equally-spaced steel balls bear into drill point seats in the driven disc. The balls are retained in holes in the driving disc by a spring-loaded ring. When the pin shears, the ball moves out of the drill point seats. This lifts the spring-loaded ring which actuates the switch and stops the motor.

The switch used in this application is a MICRO SWITCH Type E switch with a roller-plunger actuator. This switch is designed for cam or slide operation in applications where the approach of the actuating device is in the same direction as the longitudinal axis of the switch.




*You can make your machinery more automatic by using these switches for—*

**Process controls • Conveyor controls • Bulk flow controls • Level controls • Counting controls • Weight controls • Motion controls**

*MICRO SWITCH precision switches for plant use applications are available at authorized distributors in key cities everywhere. Look under "Switches, Electric" in the Yellow Pages.*

**MICRO SWITCH**
A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

**For more facts circle 552 on Reply Card**

# COURT DECISIONS — a summary of legal findings of interest to the plant engineer

*Prepared by Albert Woodruff Gray*

## Advertising Misrepresentations

IN THE CATALOG of a wire rope manufacturer it was stated of this product, "The highest type of wire rope construction plus best quality of material. This combination of material and construction produces the supreme product of rope making. The material combines strength, elasticity, toughness and flexibility in correct proportions for service and durability."

Rope purchased by a logging company was found to be worthless and ineffectual in getting out more than half the number of logs that could have been produced by rope of the catalog description.

Of the judgment awarded against the rope manufacturer, the appellate court said in its affirmance,

"In this case the agent of the manufacturer carried along with him and delivered to the purchaser the manufacturer's own printed matter containing almost the same guarantee that the purchaser proved was made to it as to the quality of the wire rope and its ability to stand use except that the general agent went somewhat further and guaranteed the wire rope to be the kind of rope necessary for the purchaser's use.

"The affirmations contained in the catalog constituted express warranties when the purchaser had knowledge thereof and acted thereon." A. Leschen & Sons Rope Co. v. Case Shingle & Lumber Co., 276 Pac. 892, Wash.

## Commercial Patent

AFTER A PATENT had been issued for a safety shield to be used with power grinding machines, the sales of the machines increased in volume over six times. Later when the charge of infringement was made against competitors by the owner of this patent, it was contended that the patents for this safety shield, which it was claimed had been infringed, were invalid for lack of invention.

In its decision, the Federal Court outlined the role played by this factor of commercial success in determining the patentability of inventions such as this.

"The infringer argues that because sales of the patentee's grinders increased during the four or five years before our country entered the war and since then, is no proof that such increase was due to the addition of a new shield. This argument would have greater weight were it not for the fact that although the patentee's shield was designed for use with the grinders which it manufactured, the demand by workers for the patented shield was such that 25 per cent of those sold were purchased for use on grinders made by manufacturers other than this patentee.

"Starting from scratch in a depression period such ever increasing sales in spite of stiff competition at less than half the cost of the grinders of this patentee, establishes a criterion of invention." Delta Mfg. Co. v. E. L. Essley Machinery Co., 63 F.S. 930.

## Damages or Penalty

PROVISION IN A contract with the Federal Government for the manufacture and sale of three 10,000-kva electrical transformers for $81,616, was for delivery not less than 150 calendar days after receipt of notice of award. It was further provided that damages should be assessed at $100 per day for each day of delay.

Notice of the award of the contract was received by the manufacturer on April 29th, but final delivery was not made until April 12th of the following year, 198 calendar days after the specified delivery date. A remission of 107 days was made by the Government and $9100 withheld from the contract payment.

The manufacturer sued the Government for the amount of this deduction. In its refusal to disturb the amount of the withheld damages, the Federal District Court said: "Considering all the facts of the case including the manufacturer's limited experience with this particular type of equipment, the extra wartime work with its attendant manpower problems and the natural mistakes which the manufacturer made in the manufacturing and testing of this equipment, the various determinations made by the Government were reasonable, fair and within the terms of the contract." American Transformer Co. v. United States, 63 F. S. 194. December 3, 1945.

## Insurance Against Negligence

EQUIPMENT WAS moved onto the property of an oil refiner in Oklahoma under a contract that the owner should furnish the equipment at his own "risk, cost and expense." The equipment had been insured against loss. When later it was destroyed by fire, the loss was paid the owner and the insurance company subrogated to the rights of the owner. Suit was brought by the insurance company against the refinery for negligence.

In sustaining a judgment against the refining company, the court said of its liability for its own negligence:

"We would not hold that a contract governing and exempting the liability for future damages resulting from the negligence of the refinery might not be entered into but it must be clear, definite, unambiguous and show on its face the exact nature, character and extent of the damages which are within the contemplation of the minds of the contracting parties.

"An indemnity contract will not be construed as indemnifying one against his own negligence unless such a construction is required by clear and explicit language of the contract.

"The contract here merely provides that the equipment owner should perform the conditions of the contract 'at his risk, cost and expense.' We hold that this language is not so clear, explicit and unambiguous as to compel a conclusion that the parties intended to exculpate this refining company from the consequences of its own negligence and therefore falls to meet the requirements of the two latter cases." Standard Ins. Co. of N. Y. v. Ashland Oil & Refining Co., 186 Fed. 2d 44, Oklahoma, December 22, 1950.

## Catalog Statements

IN THE CATALOG of a boiler manufacturer was the assertion that this equipment had the specified heating capacity of 7300 edr per hour. Also in the agreement made by a purchaser it was provided, "Manufacturer shall repair or replace without charge any parts manufactured or supplied by it which may prove defective from poor material or workmanship within one year from date of installation. The foregoing guarantee constitutes the only guarantee or warranty given or assumed by the manufacturer and it is agreed that there are no implied warranties."

When it was discovered by the purchaser that the boiler did not possess the heating capacity represented, it sued for damages for breach of warranty and was awarded a judgment against the manufacturer.

On appeal, the manufacturer con-

# COURT DECISIONS

tended that any representations in its catalog constituting warranties were waived by the provision in the purchase contract that the only warranties were those set out in that agreement.

Judgment of the lower court was affirmed with the statement by the appellate court, "The unqualified statement of capacity made in writing by the manufacturer constituted an expressed warranty. The manufacturer contends that the purchaser is precluded from recovery for breach of warranty because of the paragraph of the purchase agreement, 'The foregoing guarantee constitutes the only guarantee or warranty given or assumed by the manufacturer.'

"If a manufacturer could escape all liability for future warranties by a guarantee excluding them it would ofttimes be injurious if not disastrous to the business world and would open wide the door to fraudulent representations. We decide this case on the ground that the protective or exclusion clause in question relates only to contemporaneous or present warranties." Elliott-Lewis Corp. v. York-Shipley, Inc., 94 Atl. 2d 47, Pennsylvania.

## Penalty Damages

IN A CONTRACT for the purchase of machinery and machine parts the buyer stipulated, "In case we fail or refuse to receive said machinery or any part thereof before or after shipment, or on arrival, we agree to pay the seller 25 per cent of the amount of this contract and 10 per cent thereof as attorney's fees if placed in the hands of an attorney for collection, as stipulated and liquidated damages and not as a penalty."

When the buyers refused to accept delivery, suit was brought to recover 25 per cent of the contract price and 10 per cent attorney's fees as stipulated for damages. In its refusal to allow a recovery on this basis and limiting this seller to the actual damages sustained, the Texas appellate court said:

"We have a contract stipulating for the payment by the buyer for a refusal to accept the least valuable of the 15 parts in this shipment, of the same sum it was bound by the stipulation to pay for a refusal by it to accept the most valuable or all of the parts. This plainly shows that the purpose of the stipulation was not to provide compensation to the seller for a breach of the contract but was to punish the buyer for a breach thereof.

"Where the sum named in a contract to be paid in a breach is held to be a penalty and not liquidated damages, the amount of recovery is only the actual damages sustained." Palestine Ice, Fuel & Gin Co. v. Walter Connally & Co., 148 S.W. 2d 1109, Texas.

## Trade Secrets

AFTER SEVERAL unsuccessful efforts to interest manufacturers in his invention of an industrial stacking basket, the inventor learned of the invitation of another manufacturer for bids for the production of such articles. Under what he claimed was a pledge of secrecy, the inventor disclosed the details of his discovery to this organization, together with sketches and photographs.

In its denial of the right of this inventor to recover, the Supreme Court of Michigan said,

"Where the idea was well known or readily ascertainable the courts will rule that there is no legally recognizable trade secret. In other words, the discloser must treat the recipient of the disclosure equitably. That means that he cannot take advantage of the recipient's ignorance of the facts which are well known or readily ascertainable.

"Did the inventor's disclosure to the manufacturer place the latter in the possession of information in the nature of a trade secret? There is nothing about runners on the bottom of baskets curved upwards to form a handle nor is there anything new about having the handles in the same vertical position or having the handles of the lower basket fit inside the handles of the upper basket." Russell v. Wall Wire Products Co., 111 U.S.P.Q. 51, Michigan, September 4, 1956.

## Deliveries Refused

CONTRACT BETWEEN a dealer in scrap iron and the United States required the delivery of 80,000 tons at a price of $1,284,000. When 53,430 tons had been delivered the dealer received notice from the United States,

"The British Purchasing Commission has advised this office that they are withdrawing from the present scrap market and request that we cancel the undelivered balances of all scrap contracts. You will therefore make no further deliveries of scrap other than those already scheduled."

In awarding judgment to this dealer for $23,341.00 for its loss of profits, the Federal Court of Claims said, "In our opinion such cancellation cannot be legally justified either by the terms of the contract or by the reasons given in the letter submitted by the United States, cancelling the contract.

"The dealer was at all times ready, willing and able to perform its obligations under the contract but was prevented from doing so by the act of cancellation on the part of the Government.

"One who agrees to pay for goods on delivery, cannot set up the lack of delivery when caused by its own act. The principle that prevention by one party excuses performance by the other, both of a condition and of a performance, may be laid down broadly for all cases." David J. Joseph Co. v. United States, 82 F. S. 345, February 7, 1949.

## Contributory Negligence

A TRUCK DRIVER for a salt company was employed to deliver carboys of sulphuric acid and collect the empty containers. In his delivery in one instance of supplies of this character he was asked by the purchaser to pick up some "empties" stored in an enclosure that had been fenced as a safeguard against their hazardous contents.

The tail gate of the truck was about four feet from the ground. Finding the bottles heavier than usual the driver asked, "Are you sure these things are empty?" "I'm positive they're empty," answered the plant employee. "That's why we want to get rid of them." When he lifted the second bottle he asked again and was assured that no acid was in the container.

When he placed the bottom of one carboy on the tail gate of the truck the stopper became loose and the driver's face and neck were sprayed with acid.

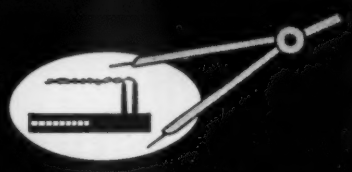
In the suit against the company from whom he was picking up these bottles, he was awarded a judgment for $5,000 and expenses. The company appealed, maintaining that the victim of this accident had been guilty of contributory negligence in not making a further and more complete investigation.

This judgment and award was affirmed by the appellate court with the comment, "It is not to be expected that one will test the presence of sulphuric acid in a bottle by looking into it or smelling it, as it is contended he should have done. This man had no reason to believe there was acid in the bottles except for the fact that they were heavier than usual.

"He did not test an obvious danger or blindly proceed but justifiably relied on the directions of this employee on whom he had the right to rely." Robb v. Gylock Corp., 120 Atl. 2d 174, Pennsylvania.

USING

# DU PONT ELASTOMERS



in industry

# How neoprene-jacketed cable protects Capital Airlines maintenance shop

## HYPALON doubles service life of belt carrying salt at 302° F.

An elevator belt, with cover made of Du Pont's new synthetic rubber HYPALON, has twice the life span of the best rubber belts that had been used at a large chemical plant. The bucket belt—operating 80 hours a week – lifts hot salt from a rotary drying kiln to a loading platform. Average temperature of the salt is 302° F.

The elevator belt with covers of HYPALON lasted six months – twice as long as rubber belts which would get brittle and crack.

HYPALON synthetic rubber has many excellent properties which help reduce your maintenance and replacement costs. Just fill out the coupon for more details.

Elevator belt with covers of HYPALON resists extreme heat of hot salt.

There may be gas vapors in this wing tank. So in Capital Airlines maintenance shop all electric cords are jacketed with neoprene for safety.

### Contact with chemicals doesn't weaken cords

Capital Airlines leaves nothing to chance in its maintenance shop. For safety's sake, cables on all portable tools and trouble lamps are jacketed in neoprene.

"These cords are used inside wing tanks and parts of the fuselage where gas vapors sometimes accumulate," says C. F. Schaub, Capital Airlines Safety Director. "It doesn't take much imagination to guess what would happen if a cord shorted inside a gas tank. That's why we must use the very safest – neoprene-jacketed cable.

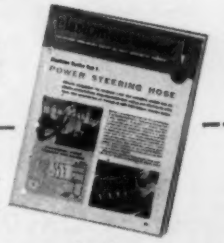
"The cords frequently come in contact with gasoline, cleaning compounds, paint thinner, acetone, hydraulic and lubricating oils which weaken other cord sheaths badly . . . weak spots that can lead to shorts . . . and trouble."

Mr. Schaub's experience with neoprene parallels the experience of engineers who have utilized neoprene's unique combination of properties for protective coatings, hose, gaskets, belting and other maintenance items. Resistance to oils and chemicals, heat, sunlight and weathering, flex cracking, abrasion and cutting, oxidation and aging – *all* combined into *one* resilient material – makes neoprene a wise choice for years of problem-free service. Just clip the coupon for more information on how neoprene can work for you.

DU PONT
REG. U. S. PAT. OFF.

**HYPALON** *is a registered trademark of E. I. du Pont de Nemours & Co. (Inc.)*

**BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY**

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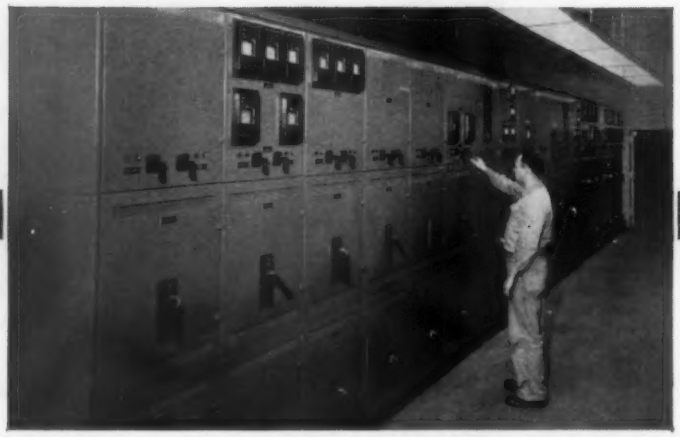
# LOW VOLTAGE SWITCHGEAR

# SAFEST!

## *No live parts exposed even in test position*



**No Open Doors** to create hazardous conditions or mar the fine appearance of the I-T-E Low Voltage Switchgear when circuits are blocked.

Consider the additional protection offered by unexposed live parts even in test position and you will understand why I-T-E Low Voltage Switchgear is the safest of them all. And there are many other reasons why this is so. Here are some of them:

**Test Position with Doors Closed.** I-T-E's exclusive extendible escutcheon method establishes a new standard of safety and convenience in testing circuit breakers.

**Reduced Handling.** Circuit breakers can be stored in their respective compartments, de-energized, with doors closed.

**Dust and Dirt Protection.** The flat dust-seal frame which surrounds the escutcheon keeps the circuit breakers free of dirt and dust.

**Extended Escutcheon** tells at a glance when the circuit breaker is in the disengaged or test position.

**Interlocked.** A mechanical interlock prevents the circuit breaker from being moved from or into the engaged position unless the primary contacts are open.

**No Open Doors** to create safety hazards or mar the modern, attractive appearance of the switchgear when the circuits are de-energized.

For complete information about the safest switchgear of them all, contact the nearest I-T-E District Sales Office, or send for a copy of Bulletin 6004B. I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.

**No Live Parts Exposed** even in test position. The exclusive I-T-E extendible escutcheon method establishes a new standard of safety and convenience in testing circuit breakers.

**I-T-E CIRCUIT BREAKER COMPANY • Switchgear Division**

IN CANADA: EASTERN POWER DEVICES LTD.

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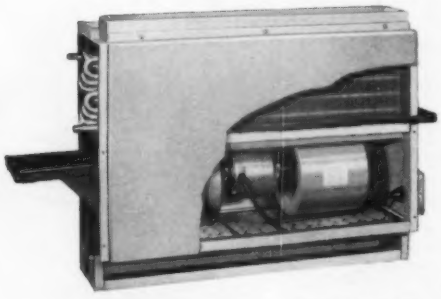
OPEN
I-T-E

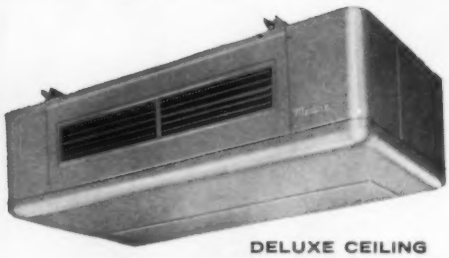
# *Why those who want the finest in*

CONSOLE



CONCEALED

OVERHEAD



DELUXE CEILING

**Modine Airditioners®**

Popular fan-coil units for cooling with chilled water, heating with hot water—from a central source. For year-round air conditioning in multi-room installations. Offered in console, ceiling and concealed overhead and in-the-wall types. Four sizes range from 2/3 to 2 tons of refrigeration. Ask for Bulletin 757.

**Modine CABINET UNITS**

An extremely versatile line of heating and ventilating units providing quiet, positive distribution of heated air with or without ductwork. Models for cooling with chilled water. Seven distinct enclosure types, plus a variety of accessories, permit matching practically any installation or performance requirement. Capacities from 120 to 640 Edr. Write for Catalog 557.

*heating and air conditioning say...*

# make mine Modine

AMONG building professionals and owners, the high quality of Modine heating and air conditioning equipment has long been recognized. Careful examination proves it to be a tangible value which benefits those who specify, install and use Modine products. This quality is a direct result of a company policy which is briefly expressed as follows—

"Modine products, while not premium-priced, are produced to meet those high standards of mechanical construction and performance excellence which long experience has proved essential to complete user satisfaction."

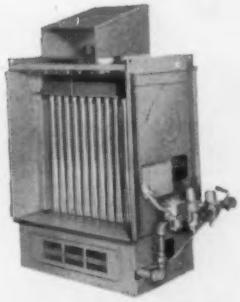
## Modine GAS UNIT HEATERS

Beautifully styled units feature light weight for easy, low-cost installation . . . stainless steel burners and stainless or aluminized steel heat exchangers for longer life . . . advanced engineering design for outstanding heating performance. Eight sizes from 25,000 to 310,000 Btu. Catalog 656-A.

## Modine STEAM AND HOT WATER UNIT HEATERS

Widest line available — includes horizontal and vertical delivery types plus Power-Throw models for use where extremely long "throw" is needed. All types are available in HCR models designed for application where severe internal corrosion is a problem. Bulletin 157.

## Modine DUCT FURNACES



Ideal for use with cooling package or for straight heating. Stainless steel burner and heat exchanger resist rust and corrosion caused by moisture-laden air or condensation. Five sizes from 88,000 to 213,000 Btu. Bulletin 855.

## Modine CONVECTORS

Attractive appearance and sturdy construction characterize the Modine line of convector radiation. Offered in 30 types and 8,000 sizes for every building need. Choice of standard or heavy-gauge enclosures. Catalog 257.

**Modine**
**MANUFACTURING COMPANY**

**1563 DeKoven Ave., Racine, Wis.**
*In Canada:* Sarco, Ltd., Toronto

**UR-1353**
**For more facts circle 555 on Reply Card**

July, 1957

**For more facts circle 556 on Reply Card** →

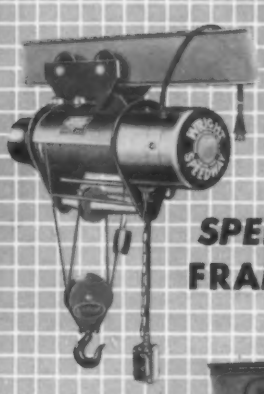
# WRIGHT Electric Hoists

**NEW ELECTRIC CHAIN HOIST**

The new WRIGHT Electric Chain Hoist is available in two size capacities: 300 to 2000 lbs. (single chain) and 3000 to 4000 lbs. (double chain). It is safe, easy to operate, rugged and durable. It is exceptionally valuable for use on production lines, over machine tools or any shop location where space is at a premium.

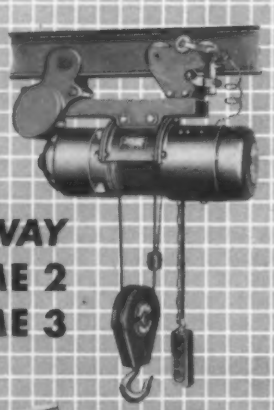
**2-SPEED *SPEEDWAY* FRAME 1**

WRIGHT now offers a *Speedway* Two-Speed Hoist in the Frame 1 size. It permits precise, gentle positioning of production work in capacities from ¼ ton to 1 ton. This hoist gives a fast lifting and lowering speed —and a slow speed (¼ the rate of the fast speed) by the use of 1800/450 RPM motors.



**SPEEDWAY FRAME 1½**

WRIGHT *Speedway* Electric Hoists are built to meet the many and varied demands of modern high-speed production. Many design improvements minimize maintenance costs and down-time. The Frame 1½ Hoist will handle loads of from 1½ to 2 tons. The Type L-1½ shown is 4-part reeved and intended for relatively slow lifting speeds.



**SPEEDWAY FRAME 2 FRAME 3**

WRIGHT Frame 2 *Speedway* Electric Hoists are capable of handling loads from 1½ to 6 tons. The Frame 3—from 1½ to 10 tons. WRIGHT *Speedway* Hoists are available with single or variable speeds and with a wide variety of mounting arrangements to meet specific requirements.

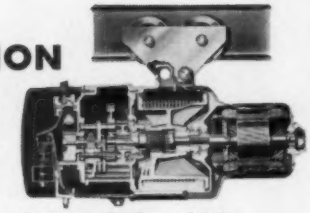
**FOR COMPLETE INFORMATION**

**Ask for the following booklets for complete information on WRIGHT Hoists and Crane components: Speedway Hoists (Frame 1-1½) Booklet DH-133B, (Frame 2 and 3) Catalog E-55B • Motor Driven Cranes—Underhung, Single Bridge—Bulletin #227; Top Running Cranes—Bulletin DH-448 or DH-449 • Crane Drive Units—Booklet DH-431A • Hand Traveling Cranes—Bulletins DH-468 and DH-348B.**

# for Lowest Final Cost

## These features make WRIGHT Speedway Hoists your best buy for—

### MORE PRODUCTION

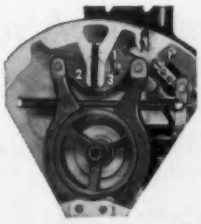


Fine balance and heavy duty design make possible the continuous handling of tough jobs on any duty cycle for which a 30-minute NEMA motor is satisfactory. All gears and pinions are alloy steel, heat-treated. Their ductile core supplies shock resistance to most severe service stresses. Anti-friction bearings throughout.

### LONGER LIFE

Strength of gear teeth of WRIGHT Frame 2 and 3 Speedway hoists has been doubled by a change in contour and grain structure of the metal. Internal gear ring with heavy flanged cross section is bolted to drum at six points and provides extreme resistance to distortion.

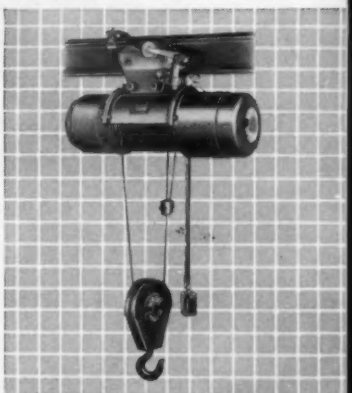
### EASIER MAINTENANCE



There is nothing to adjust but the cam to keep brake in perfect adjustment. When excessive load drift occurs... remove the screw shown at Position 1, swing the cam until Position 2 is in line. Replace the screw. Position 3 is provided for the final third of brake lining wear. Brake springs and solenoid never need adjustment.

## Better performance at lower cost by using WRIGHT units for local-built cranes

### SPEEDWAY ELECTRIC HOIST

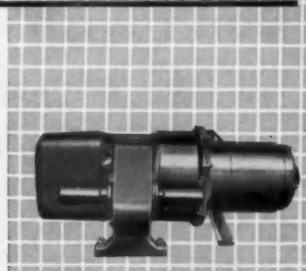


Available in Frame 1, 1½, 2 and 3 sizes with capacities from ¼ ton to 10 tons.

### END TRUCKS

For motor-driven cranes and hand traveling cranes—both top running and under-hung types. Timken bearings throughout. Wide range of capacities.

### CRANE DRIVE UNIT

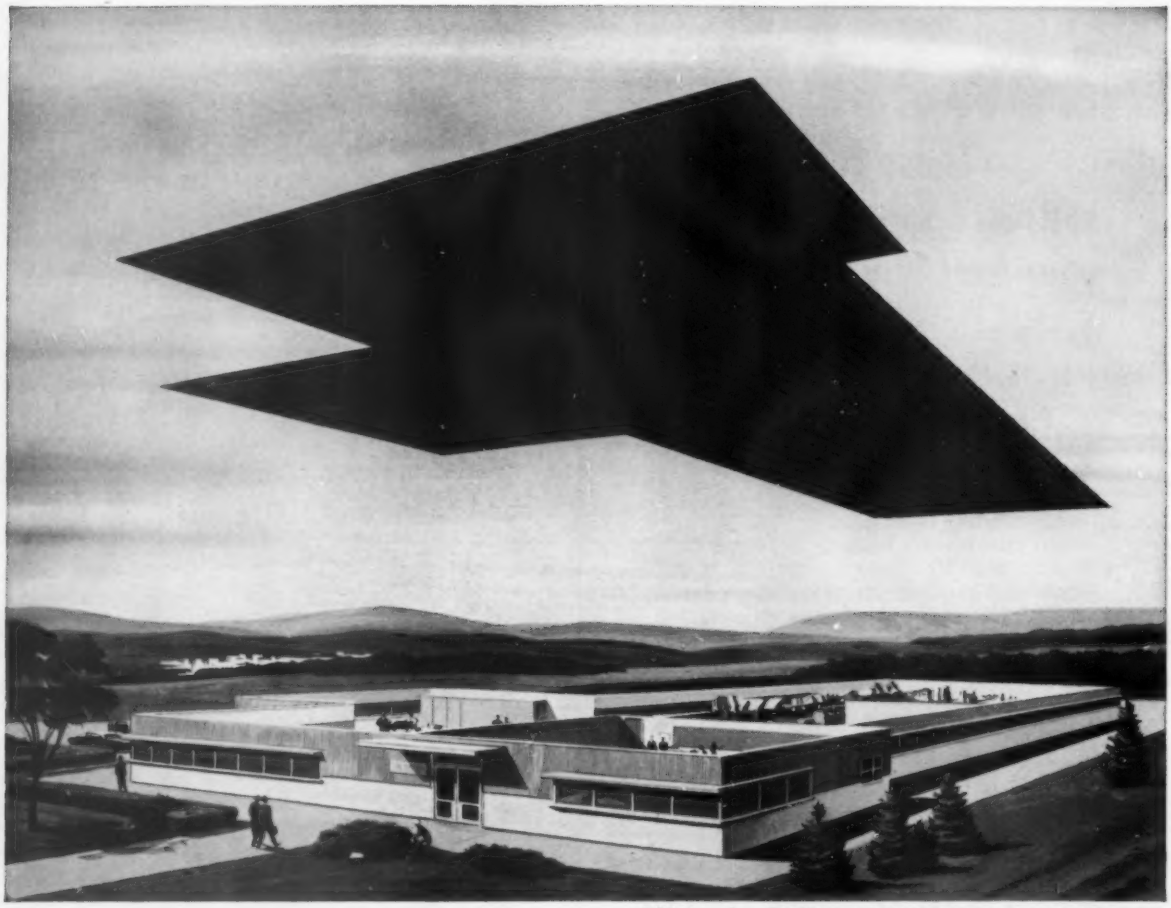


For crane and double-beam trolley propulsion. Electric motor transmits power through fluid drive to well proportioned gear reduction. Units are equipped with WRIGHT designed solenoid "drag" brake. Size 1—with motors to 2 HP. Size 2—with 3 to 7½ HP motors.

**Wright Hoist Division**
**AMERICAN CHAIN & CABLE**

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO



J-M Aquadam Roofs provide lasting roof protection. They are specifically designed for low pitch and dead level roof decks.

# Don't wish a good roof over your building...

## *install a Johns-Manville Aquadam Built-Up Roof and be sure*

A GOOD ROOF is in reality a valuable "over head" investment. The roof is subject to the hardest wear of any part of a building. Johns-Manville Aquadam Roofs provide long-lasting protection with a minimum of roofing repair and maintenance expense.

J-M Aquadam Roofs owe their superiority to Aquadam, the modern cementing agent used in the application of felts. Aquadam has exceptionally high adhesive and permanent bonding properties. It has approximately twice the ability of typical asphalts to retain its initial properties on exposure.

Aquadam Built-Up Roofs resist beating rains, winds, melting snow and ice. The result is thorough watertightness in low sloped and dead level roofs.

The high ductility of J-M Aquadam helps prevent roof cracking. Aquadam reseals and repairs itself after being subjected to the equivalent of summer roof temperatures.

Aquadam Built-Up Roofs are available in both smooth surfaced and slag or gravel specifications.

If planning a new roof installation or replacing an old one, you'll assure your building of reliable protection, by specifying a J-M Aquadam Built-Up Roof. Your Approved Johns-Manville Contractor is listed in the Classified Section of the telephone directory. For complete details, write: Johns-Manville, Box 158, New York 16, New York. In Canada, write 565 Lakeshore Road East, Port Credit, Ontario.

THE AMERICAN INSTITUTE OF ARCHITECTS 1857-1957

Johns-Manville congratulates the American Institute of Architects on its 100th Anniversary.

*—Consult an architect—use quality materials.*

JOHNS-MANVILLE JM PRODUCTS

**Johns-Manville**



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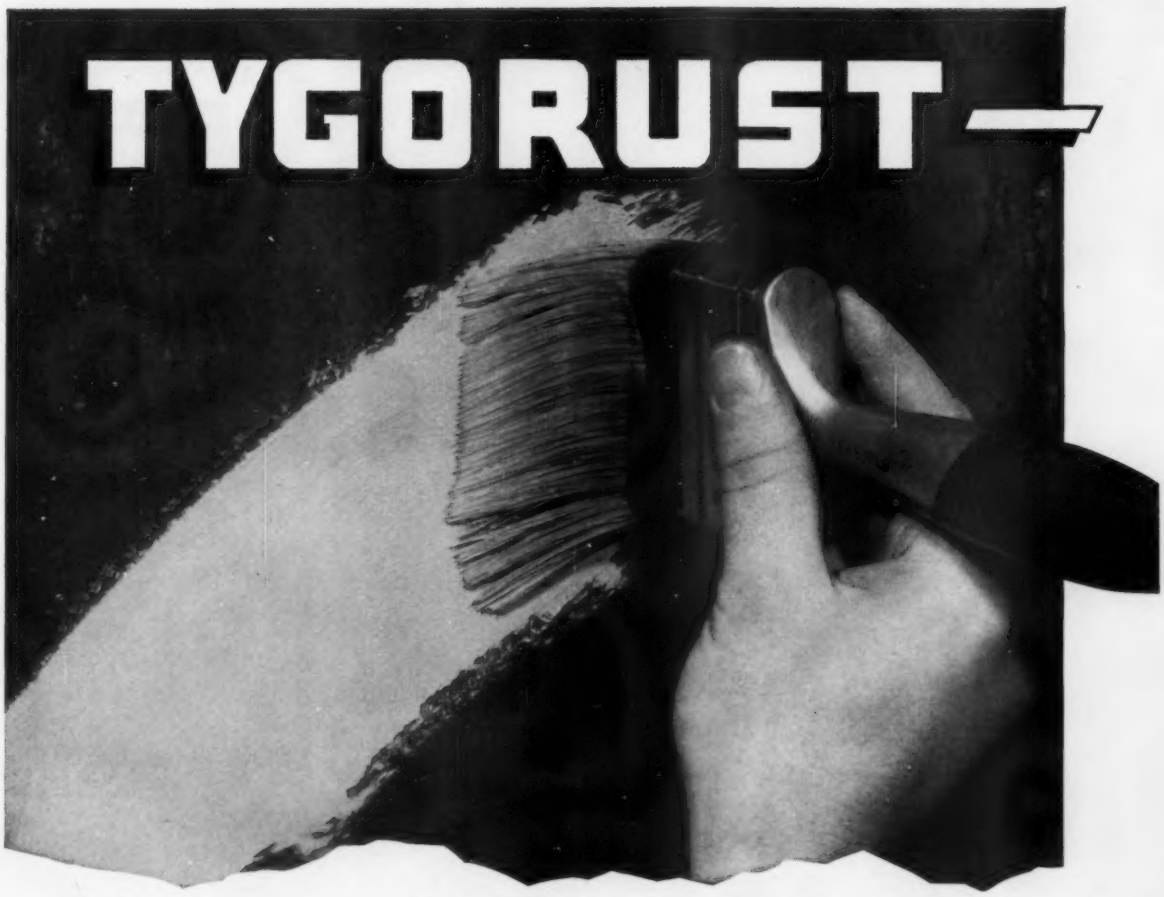
# TYGORUST—



## locks vinyl top coats to damp or dry rusted steel

- ***Holds surface preparation to a minimum***
- ***Can be top coated within an hour***

Tygorust Primer licks the big problem in using vinyl-based protective coatings: **Adhesion.** Not only does Tygorust assure a well bonded top coat to the steel it is to protect, but it does it economically.

Forget sandblasting. Tygorust actually works better on rusted surfaces. Just wire brush loose or flaky rust and apply Tygorust. The steel can be dry or damp — it makes no difference. (You can brush or spray Tygorust on dry steel—damp steel should be brushed.) Use Tygorust on concrete, too.

You can overcoat Tygorust with any finish material; but for real corrosion-resistance, make the finish coats Tygon—the corrosion-resistant paint that has stood the test of time.

***This FREE Painting Manual can help make your fight against corrosion easier***

Contains a wealth of practical data in its many sections: how to simplify surface preparation; what top coating to use for over one hundred corrosive conditions; how many coats; how to maintain coatings in good condition; common spraying troubles and how to remedy them. It's free on request. Ask for the Tygon Painting Manual.

*Plastics and Synthetics Division*

**U. S. STONEWARE**

**AKRON 9, OHIO**

342E-1

**For more facts circle 558 on Reply Card**

DESIGN TESTED AND VERIFIED
in the
Westinghouse
HIGH POWER LABORATORY

# Now Westinghouse announces complete control center flexibility

## *New design meets changing requirements with both 14- and 9⅓-inch modular units*

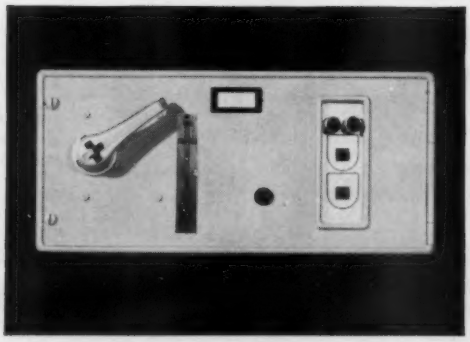
From the new 9⅓-inch units to the dependable electrical components, the new Westinghouse control center is designed to meet your present requirements and future needs. Both the 14-inch and 9⅓-inch units can be quickly interchanged within a standard structure.

Fully interchangeable with the old design, this new control center is available for front mounting or back-to-back mounting . . . in same structure with common vertical bus. Everything about this new Westinghouse unit says good design, safety, and versatility. And you have the advantage of dealing with one source to supply all components. Call your Westinghouse sales engineer for all the facts. Or, write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. Ask for B-6722. J-21941

YOU CAN BE SURE...IF IT'S

Westinghouse

**Slight Movement of Retaining Clips** . . . and horizontal starter unit support bar can be moved to any position for interchangeability of 9⅓- or 14-inch Westinghouse modular units.



**Door Cutout** makes it unnecessary to change door when changing pilot device arrangement. Quick-make, quick-break, positive-action, modern pushbuttons in strong molded case take up less space.

**Here Is Complete Flexibility** . . . of structural units and electrical components. Each vertical structure holds from one to eight, front only, or up to 16 back-to-back units, to meet all needs.

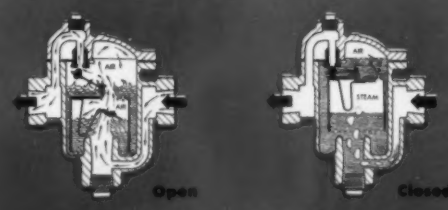
**For more facts circle 559 on Reply Card**

# NO OTHER STEAM TRAP

## gives you all these features for Low Pressure Heating Service!

**1. QUICK HEATING**

Use of a "blast" bucket with auxiliary thermic vent gives maximum air-handling capacity. Air and water blow straight through until steam closes vent.




**2. EASY INSTALLATION**

Any pipe connection—horizontal, vertical or angle—available for the majority of installations to save time, labor and fittings.

**3. INTEGRAL STRAINER**

The four most commonly used trap sizes are available with strainers built-in to the body to save time, labor and money through faster installation with fewer fittings.

**4. STAINLESS MECHANISM**

Valve and seat of hardened chrome steel, all other parts 18-8 stainless—*identical* to materials and workmanship used in traps for 900 lbs., 900°F.

**Dependable... Guaranteed Performance...**

Self-scrubbing... Non Air Binding... Immune to Corrosion.

Traps and Parts in Stock in Over 100 Cities. Call your nearby Armstrong Representative or Jobber Today.

**ARMSTRONG MACHINE WORKS**
9127 Maple Street, Three Rivers, Michigan

***Send for Catalog***

—the Armstrong Steam Trap Book gives complete data and prices, tells what size trap to use.

# ARMSTRONG STEAM TRAPS

For more facts circle 560 on Reply Card

# What's Just Ahead in This Issue?

THERE'S A LOT of ocean between the plant engineers in the United States and those in Great Britain . . . . but the function, and its problems, are the same on both sides of the pond. At the 10th Annual Conference of the Incorporated Plant Engineers, in Buxton, England, Associate Editor Andy Anderson had a chance to compare notes with your British counterparts. For his comments, and a description of the travels of an American editor in England, turn to page 100.

WHEN A MACHINE breaks down at Douglas Aircraft Company's El Segundo Division, it doesn't take long to get it back in operation. This is made possible thanks to the plant engineering people installing and equipping an in-plant service department. To see how this department operates, see page 102.

HERE IS A set of charts that will assist you in sizing pipe for a compressed air system. With information on the operating pressure, free air required and allowable pressure drop, all you have to do is plot these on the chart to get the correct pipe size. Charts covering four pressure drops are included in the article which starts on page 96.

TWO-FOR-ONE is not something for nothing but a clever method used by the author to double the capacity of a welder bus system. The same method could be used for concentrated machine loads with appropriate demand factors. If you have overload feeders or transformers be sure to read this article starting on page 112.

LIGHTING SYSTEM COSTS are important to the plant engineer. What system should it be? Filament, mercury or fluorescent? Here are 12 lighting installations with enough information to permit you to apply them to your own jobs. The estimated hourly operating costs are also shown in this article that begins on page 119.

WHEN DOES AN engineer stop studying? According to this author, "Never, if he wants to be a good engineer." To help them refresh their memories on the fundamentals and to keep abreast of changes, engineers at Western Electric Co. set up informal class sessions to discuss various subjects. The success of the first experiment has led to more. Why not try it in your plant? See page 136.

THIS CONVEYOR is "on the move" in all kinds of weather. It was important that International Harvester Co., install a conveyor system that could handle these large parts smoothly and efficiently. It was also necessary to take these parts out-of-doors and the conveyor system had to be so designed to continue operations under any weather conditions. To see how they solved this problem, refer to page 115.

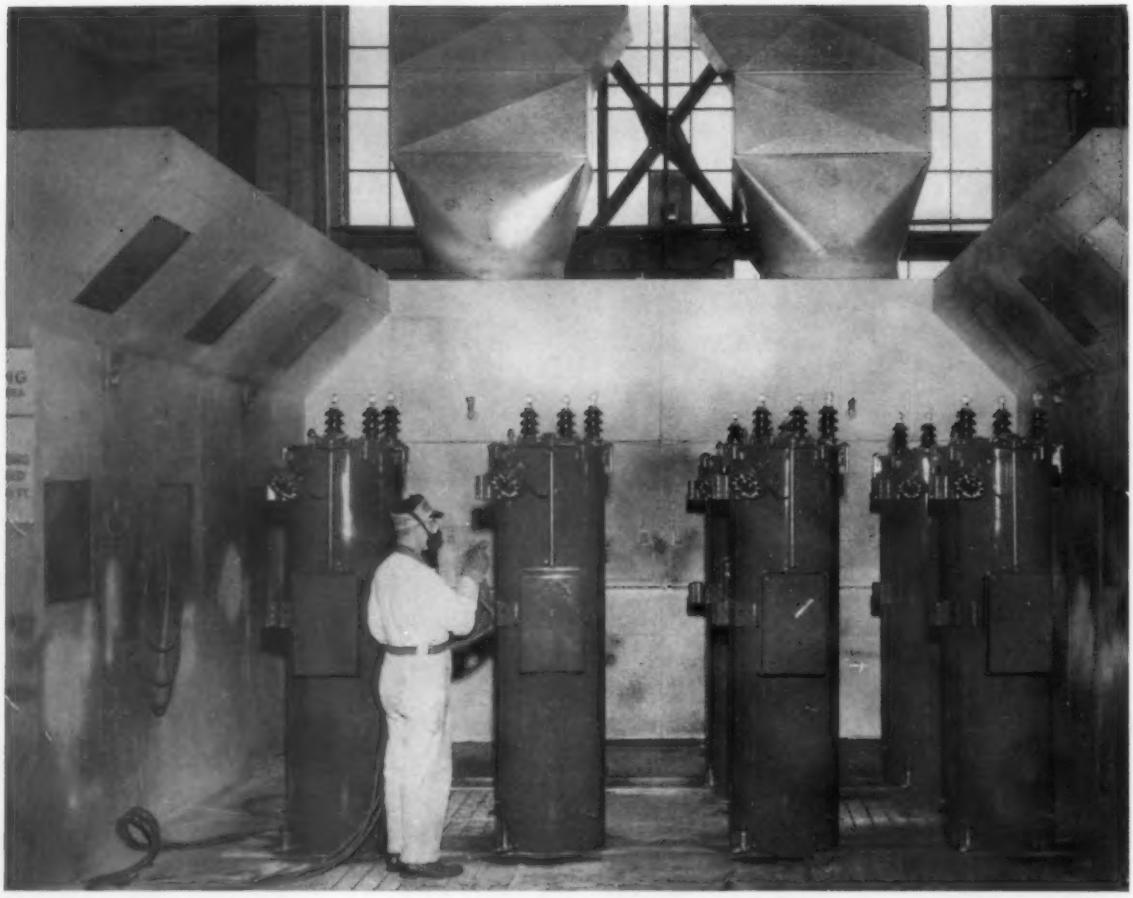


Fig. 1. Spray booth is open at top and front, to permit easy handling of equipment to be painted, and to improve air flow

# Designing a Downdraft Spray Booth

## Simple Construction Cuts Pit Costs

Spray booth designed by plant engineering personnel simplifies construction, permits heavy floor loads

By Warren St. John, Asst. Plant Engineer, Allis-Chalmers Manufacturing Co., West Allis, Wisconsin

TO FUNCTION effectively, a paint spray booth should be designed to perform several important operations. It should remove fumes from the building in which it is installed, conveniently handle the work being painted, and remove the paint pigments from the air stream before exhausting it to the atmosphere.

It has been our experience that the downdraft type of exhaust offers definite advantages in connection with spray painting of large pieces.

Since with this type of booth the air is moved downward, it is always traveling away from the breathing zone of the operator. Then, too, the material handling problems are simplified, since the booth is wide open and conventional overhead handling systems can be used. Lighting is greatly simplified, since sidewalls and roof are not required. Where sidewalls are installed to afford protection from overspray to adjacent areas, lighting can be installed in the sidewalls themselves.

On the other hand, there have been several disadvantages to the downdraft spray booth. One has been the high cost of constructing the pits with the steel beams required to safely carry heavy loads. In one downdraft booth at our West Allis Works, steel beams 24 in. deep were used to carry the weight.

Also, where pumps and motors are placed below floor level, the pits in which they are installed are subject to flooding which could result in motor failures.

A new downdraft water-wash paint spray booth of economical design and construction has been placed in operation at our West Allis Works. Measuring 15 ft by 17 ft with an open top, the booth can be used to effectively handle pieces weighing over 50 tons

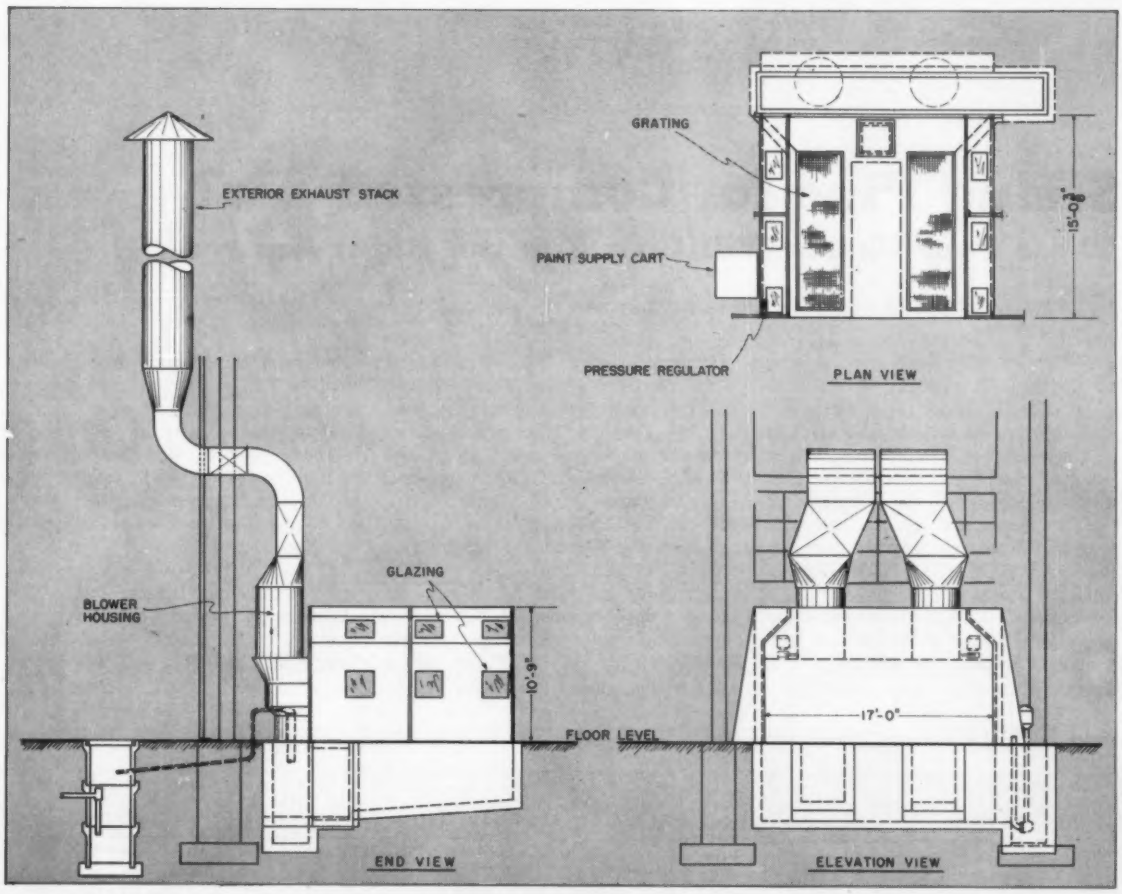



**Fig. 2. Plan and elevation drawings of booth show pit location and construction. Standard metal grating cover trenches**

and measuring 10 ft by 10 ft and up to 20 ft in height.

This new spray booth has been designed to overcome the disadvantages previously listed. Pit costs were reduced between $5,000.00 and $7,000.00 by installing two parallel trenches in the floor, each three feet wide and 15 ft long, perpendicular to a third trench that runs across the back of the spray booth. The two parallel trenches are covered with floor grating of sufficient strength to carry the required loads. It was found that the depth of the trench could be reduced since this construction required no extensive supporting steel which would have reduced the effective cross sectional trench area.

Air travel is down through the grating into the two parallel trenches and from there into the third trench which serves as a water reservoir and plenum chamber. The air then moves up through the sheet metal wash section above floor level, and is exhausted to the outside.

Use of a vertical pump in the sump places the motor completely above the floor, which eliminates flooding, and the whole assembly can be easily removed for maintenance.

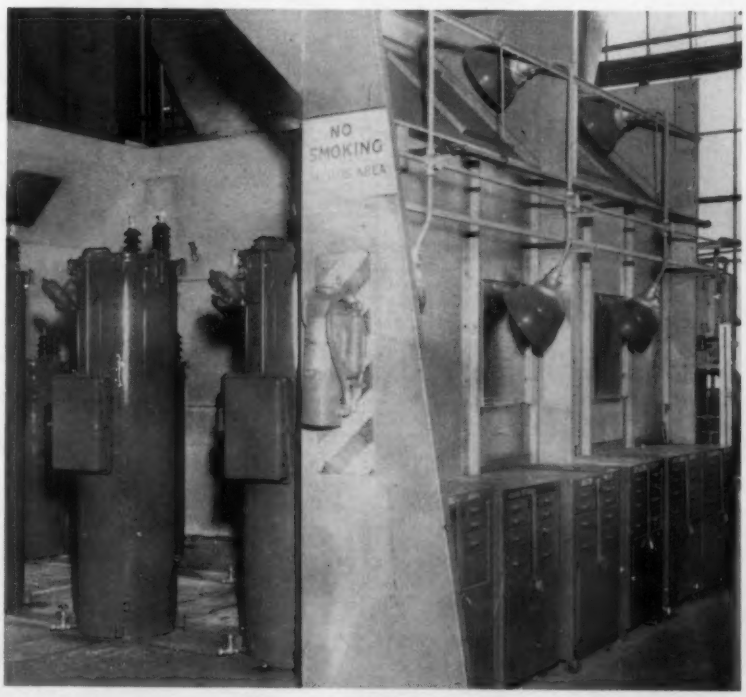



**Fig. 3. Fixtures mounted outside spray booth wall light booth through glazed panel**

# Sizing Pipe for Compressed Air?

## These Four Charts Will Give You the Right Answer

**By WILLIAM W. GAYLORD, Consulting Engineer**

SINCE IT IS usually desirable to use smaller pressure drops with air than with steam, these charts are made for pressure drops of from 1.25 to 5 per cent per 100 ft of pipe.

These charts are arranged so that if the operating pressure, volume of free air required and the allowable pressure drop are known, the pipe size required can be taken directly from the charts.

**Example:** A compressor with a capacity of 1200 cu ft of free air per minute is installed to operate at 125 lb gage pressure.

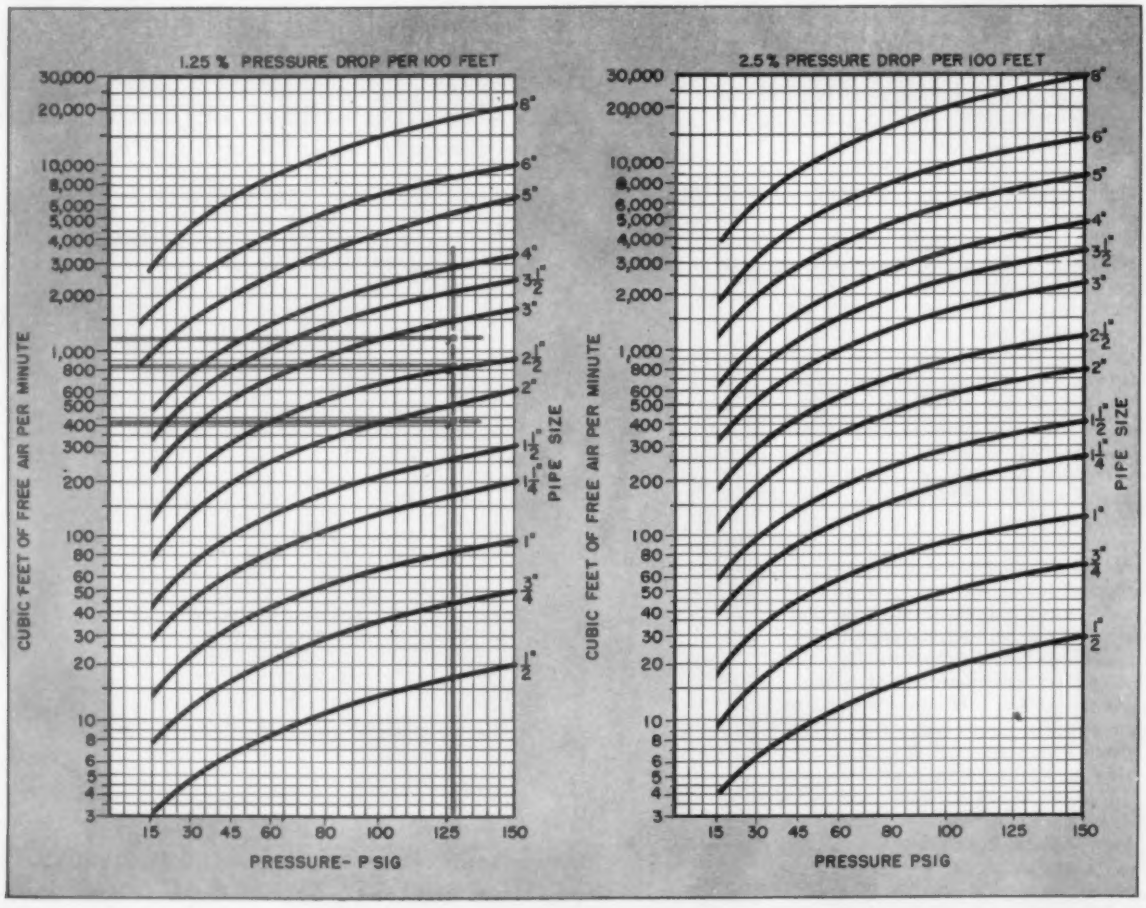
Equipment at a distance of 400 ft from this compressor will require 400 cfm at a pressure not less than 117 lb. There will be two branches from the main; one at 150 ft and the other at 300 ft from the compressor. Each of these branches will require 400 cfm.

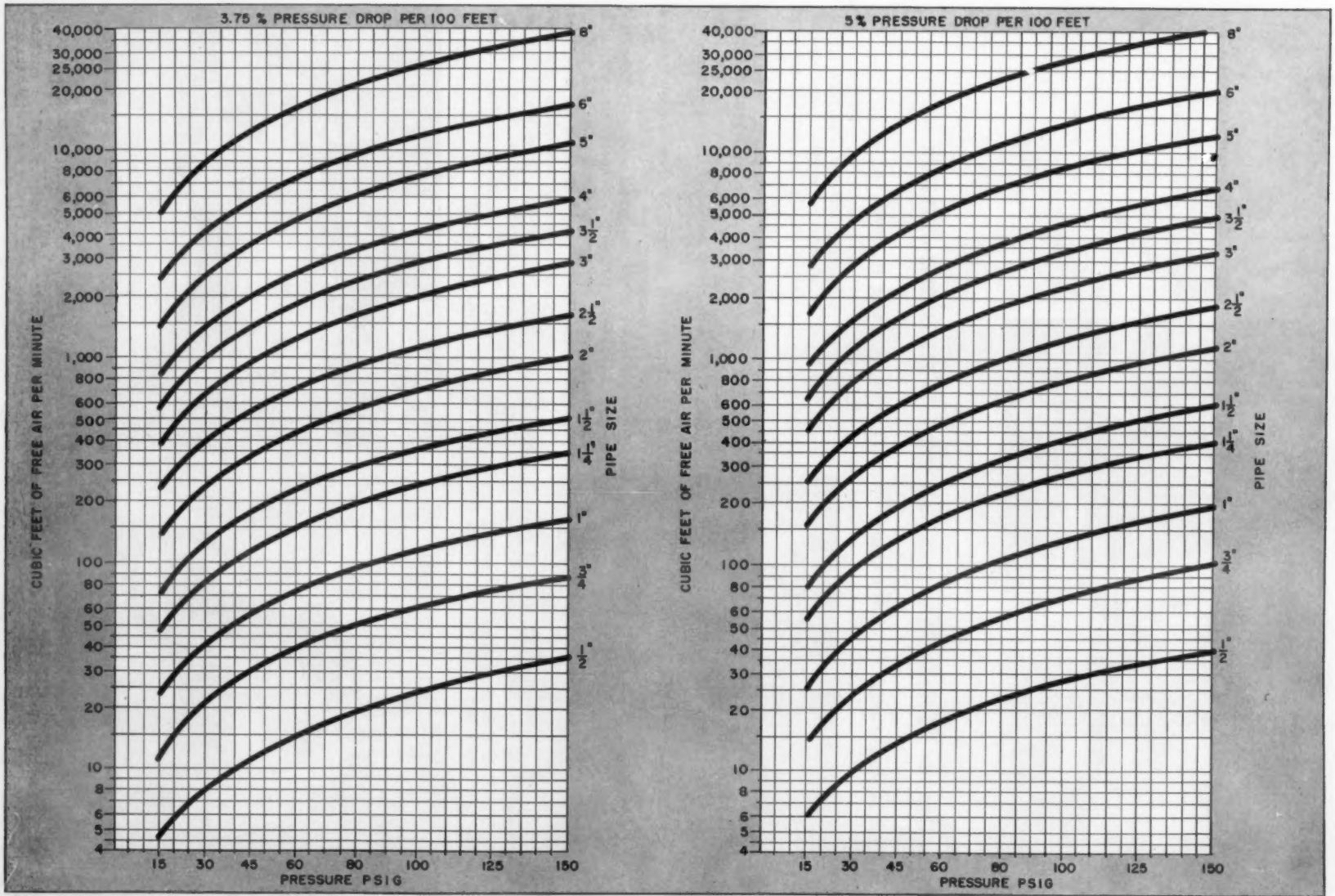
Experience has shown that for this type of system, the equivalent pipe length will be about 1¼ times the actual length because of valves, fittings, bends, etc. Based on this, an 8 lb drop (125-117) in 500 ft (400 x 1¼) is about 1.25 per cent per 100 ft. Therefore, the chart with a pressure drop of 1.25 per cent should be used. See left chart, below.

Referring to this chart, a 3 in. pipe would be required from the compressor to the first branch, a 2½ in. pipe from the first to the second branch and a 2 in. pipe from the second branch to the equipment.

If air tools are used intermittently, it is usually safe to use one of the charts for a higher percentage pressure drop. Be careful, of course, to select the chart that will not exceed the allowable pressure.

**These compressed air pipe sizing charts should be used for pressure drops of 1.25 per cent and 2.5 per cent per 100 ft**






These charts should be used to determine correct size for pipe in a compressed air system which will have either a 3.75 per cent or a 5 per cent pressure drop per 100 ft

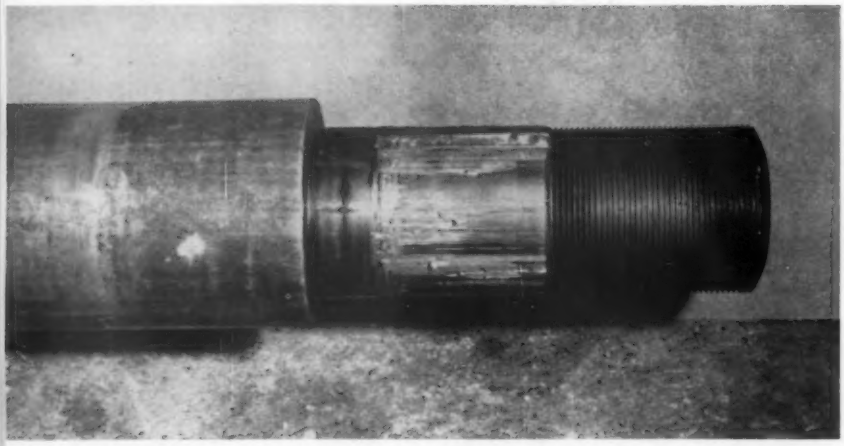


Fig. 1. This is a chewed-up end of the turbine "relief valve" that was repaired in the author's department by metallizing it with stainless steel rod

# Stainless Metallizing Saves Turbine Shaft

By LLOYD McWILLIAMS, Maintenance Supervisor, Shawinigan Water & Power Co.

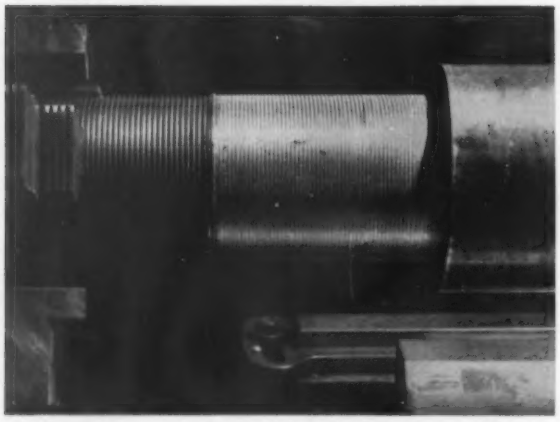


Fig. 2. Preparation for metallizing consists of cutting eight vee's to the inch. Sharp section of vee's are rolled blunt

IN RECENT years metallizing has come into considerable utilization in salvaging machinery parts economically. Its use is generally confined to parts not subjected to undue stress or impact forces.

In the hydroelectric field the applications are many and repairs have been made which, by other methods, would have been more costly and time consuming. In some instances, a considerable quantity of costly material is saved.

The accompanying photographs show one of the ideal applications for metallizing.

The part shown is the stem from a large "relief-valve" on an old 20,000 hp, horizontal turbine. This stem, 12 ft in length, and 8 in. in diameter at the lower end, had become badly scored on the bronze sleeve at the lower end.

It is perhaps of interest to note that instead of renewing the bronze sleeve, or rebuilding it with spray-bronze, it was rebuilt by applying stainless steel. This, of course, called for grinding. However, it is believed that stainless will make for a more lasting job.

Fig. 3. After preparing the bronze sleeve, stainless steel was applied. Note air nozzles beneath sleeve for cooling

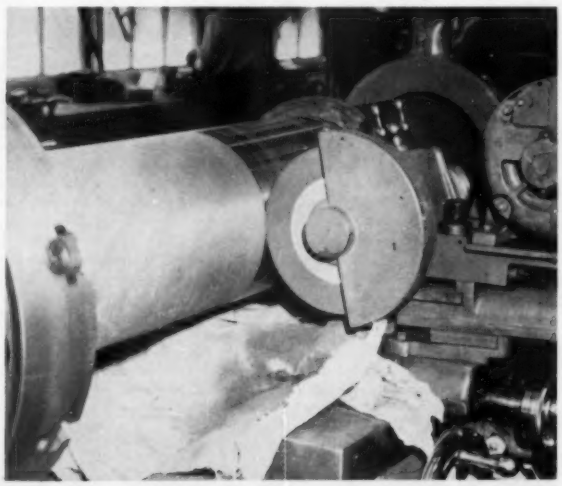


Fig. 4. Harder grades of stainless cannot be machined; finishing must be done by grinding so don't apply too much

# Sandwich Panels Used—Savings: $162,000

## Panels Consist of Cellular Glass Between Two Layers of Concrete

WHEN RECONSTRUCTING and adding to their plant at St. John, New Brunswick, the Irving Pulp and Paper Co. decided to utilize a concrete-cellular glass sandwich panel one-third the thickness of conventional construction.

By applying over 180,000 sq ft of the panels to the steel framework of new and existing buildings, the company estimates they have saved $162,000.

These savings were calculated on the basis of the 18-in. conventional wall which would otherwise have been required for a building of this type. This would have cost $3.50 per sq ft, installed.

The panels, composed of 2 in. of concrete, 2 in. of Foamglas insulation and 2 in. of concrete, cost $2.15 per sq ft plus 45 cents per sq ft for installation—a difference of 90 cents per sq ft.

In addition, Chief Engineer and Assistant Manager of the plant, Hans W. Klohn, said that the construction time was half that of conventional construction. A five-man crew of the company's own construction men erected 1500 sq ft of wall a day.

This type of panel has also simplified the job of moving machinery into the building. All that is necessary is to unhook the sandwich panel from the steel frame, lower it by crane, and move the machine into position. The panel is then replaced. The whole operation is quick and inexpensive compared to the former practice of demolishing and rebuilding a brick wall.

Because of the high moisture conditions of the pulp mill, it was important that the panels be insulated to resist formation of condensation. In addition, the comfort and morale factor of the employees had to be considered in the changeable winter conditions prevailing in New Brunswick.

The choice of insulation for the panels was important since it had to be inorganic, incombustible, and most important, completely moisture-proof. Foamglas insulation, a product of the Pittsburgh Corning Corp., met these qualifications.

Panels were constructed by the Creaghan and Archibald Co.

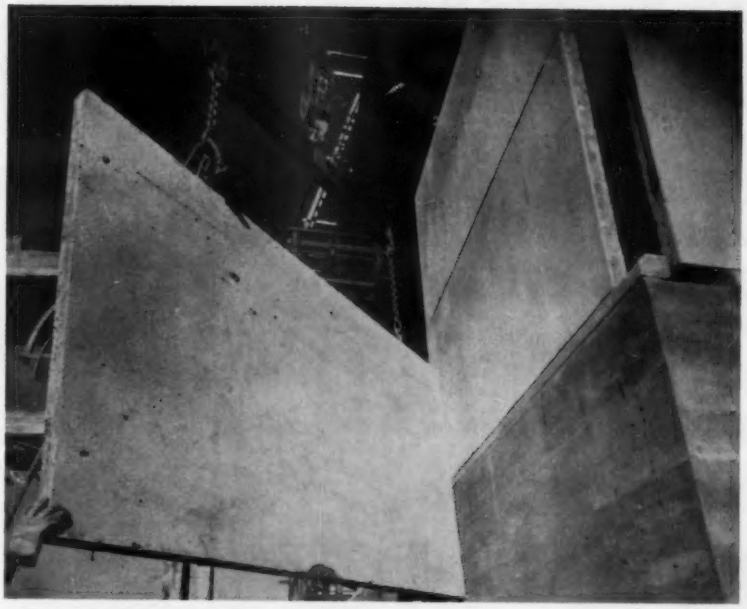


**Fig. 1. Concrete-cellular glass panel is swung into place. The sandwich panels consist of 2 in. of concrete, 2 in. of insulation and another 2 in. of concrete**

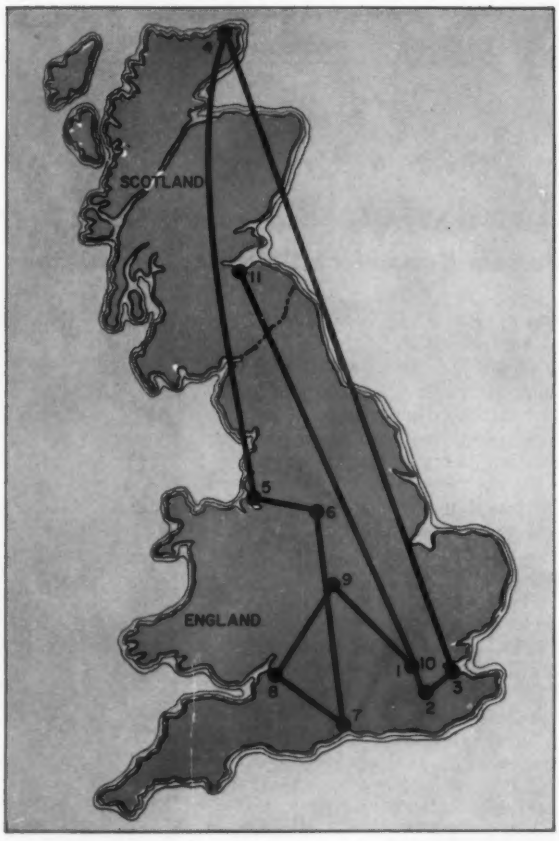
**Fig. 2. Over 180,000 sq ft of these sandwich panels were applied to the new and existing buildings. The company saved $162,000 by using this type of panel**

# An Editor's Report...

# I. Plant E. Conference Buxton, England, 1957

# And Plant Engineering In The British Isles

By H.E.B. ANDERSON, Associate Editor




BY THE NUMBERS... that's not the way I saw England, but it presents the best way of following the trail of an enterprising American editor, loose in the British Isles.

1. Naturally, this is London. Here, I started three interesting weeks, by meeting Messrs. George Rooley and Colin Troup, members of the London Branch of the Incorporated Plant Engineers (I. Plant E., to the informed). Through the efforts of Mr. Rooley, I had been invited to speak to the London Branch, on the subject of Plant Engineering in America; Mr. Troup, as an industrial magazine editor, had arranged several plant visits for me.

Meeting with and speaking to the London Branch of IPE was a rewarding experience. These men, as did I, found many similarities in plant engineering on both sides of the Atlantic. They were curious, and their questions revolved around the methods and materials in the U.S...how much automatic control did we have; is the maintenance incentive system well established in America; how widely are plastics coming into use structurally; and, one that was a bit difficult to answer objectively..how does an American plant engineer feel about replacing a piece of equipment, particularly one that is still producing, but is outmoded?

2. New Hythe. Here, in a small town in Kent, is one of the mills of the Reed paper producing organization. With my industrial experience in paper mills, I admit to considerable nostalgia as engineer William Newton, of the Steam Department, and his assistant Charlie Smith, took me around the mill.

Discussion with Bill brought out an unusual situation, from an American point of view. Reed's organization, with several plants in the immediate area of Aylesford (also in Kent, a short distance from New Hythe) were considering a central steam and electricity generating station, to serve the several plants. The question: should it be a conventional steam plant, or a nuclear reactor station? With England's decreasing supplies and increasing cost of coal, the use of nuclear power is a topic much more likely to be "bandied about" among engineers in England than in this country.

Although present American practice is, admittedly, lagging behind the British in this particular field, the question of nuclear versus coal or oil is a question that will soon enough be plaguing plant engineers in this country.

3. Isle of Grain. The Kent Oil Refinery, of the British Petroleum Company, is located on what is actually

**Poised on the edge of Pentland Firth, Dounreay site stretches between two reactors**

an island, between the estuaries of the Thames and Medway Rivers.

This refinery, on which construction was started in 1950, is an excellent example of modern design practice. And, doubling in size. When the present expansion is completed, capacity will be 4 million tons of crude per year.

Accompanying me on the tour, having arranged it, was L. C. J. Bayley, of Shell-Mex and BP, the marketing agency for BP. "Bill" Bayley was, at the time, President of the I. Plant E. Our guide, L. V. Jones, provided us with an extensive and informational tour. One of the highlights was luncheon with the refinery's Manager, C. S. Cleverly. In honor of his guests, who included several German engineers in addition to myself, the table was bedecked with American and German flags. I feel, however, that Mr. Cleverly took considerable pleasure in pointing out my ignorance of the fact that the state of Ohio was never officially accepted into the Union until April 1953!

4. Dounreay, Scotland is about as far north as you can go in the British Isles, without getting your feet wet. Here, on the site of a World War II airstrip, the United Kingdom Atomic Energy Authority is erecting an experimental breeder reactor . . . to investigate the possibilities and problems of future industrial reactor designs. In addition to the fast reactor, a materials testing reactor will also be built on the site, for irradiation testing of new materials, components and cooling systems for future reactor designs.

An official press tour of some 150 writers and editors afforded an opportunity for me to visit the reactor site.

The steel sphere, 135 feet in diameter, is considerably lessened in size, when viewed in its surroundings of bleak, treeless northern Scotland; inside, however, it takes on new dimensions. Entering the sphere through an airlock just below the "equator" of the sphere, you are on the top of the concrete vault encasing the reactor and its primary cooling system..a liquid metal to liquid metal heat exchange.

5. Liverpool, where I visited the plant of J. Bibby & Sons, Ltd., processors of seeds and nuts for the extraction of oils. John Veale, Works Engineer, and a past president of I. Plant E., has a responsibility that strikingly parallels that of many U.S. plant engineers . . . a multi-building, multi-story plant, making a product that is at best difficult to handle.

6. Buxton, site of the Tenth Annual Conference of the Incorporated Plant Engineers. Here, in three days, I found even more marked similarity between British and American plant engineering practice. Conference theme was "The Plant Engineer's Adaptability to Change", and if I had heard just one Texas drawl, I would have thought that it was the Plant Maintenance and Engineering Conference!

Speakers at the Conference talked on "The Plant Engineer's Orbit" and "The Impact of Automation on the Plant Engineer." Group discussions were held on the subjects of modern trends in factory design and equipment, the value of budgetary control to the plant engineer, and how to get the best from maintenance personnel.

I formed the impression that the response to new materials was not quite so quick in Britain as in the States, probably because less industrial building is being done in Britain. It was pointed out, in the discussion on trends in building, that the prime problem was not that of designing new facilities, but making optimum use of the facilities already existing.

7. Southampton, one of the major ports serving the British Isles. I was invited to tour the docks with a group of engineers from the various plants of the W. D· and H. O. Wills Company, one of the leading tobacco processing companies in the country. . Mr Rowland Cobbold, Chief Electrical Engineer of the company, was organizer of the tour, which included 27 engineers in addition to Mr. Cobbold and myself. An enroute stop was made to inspect the Otterbourne Water Works, one of the major suppliers of water to the Southampton area.

Engineering-wise, the highlight of the Southampton tour was the King George V drydock..the world's largest. The 58,000,000 gal of water in

(Continued on page 204)

Vincent Taylor, I. Plant E. President, wears badge of office. L.C.J. Bayley, right

In Scotland, Andy Anderson (left), British Editors Irene Salzman and Ron Sharp

Fig. 1. Reassembling a completely overhauled Milwaukee mill just prior to returning it to production service in plant

# In-Plant Machine Maintenance

## Twelve Men Turn Out Better Job Faster and Cheaper Than Did Outside Maintenance Contractor

By C. M. VIGIL, General Foreman, Maintenance
Plant Engineering Div., Douglas Aircraft Company

WHEN A MAJOR production machine, such as a turret lathe, drop hammer, punch press, big mill, or Hydrotel breaks down at the El Segundo Division of Douglas Aircraft Company, or when wear indicates that an overhaul is necessary a minimum of time is required to get the machine back in condition, back on the job, and ready to go.

The major machine unit never leaves

Fig. 2. Interior of a milling machine gear and column casting is coated with Glyptal to prevent sweating and rusting

**Fig. 3. Reboring the turret on a Gisholt lathe after all other alignments have been made from a common center**

the plant during this repair or overhaul cycle. It is simply routed through a recently organized and highly specialized department in the plant engineering maintenance division where the work is accomplished by in-plant maintenance personnel. All defective parts are replaced. Check and control surfaces are trued and smoothed. Realignments are accomplished. When the machine is returned to the production line, no effort has been spared to make it just as good and accurate as when it was new.

Two prime factors inspired the plant engineering department to install and equip this in-plant department for the overhaul and maintenance of major machine units. Before the department was organized, it was customary to send such machines to an outside shop for overhaul and repair. This practice gave plant engineering little control over the time element involved. The outside shop could not give Douglas work precedence over work from other companies, and as a result, many badly needed machines were slow in returning to production. So cutting machine down-time to a minimum was one of the prime factors.

Secondly, outside repair work on a large machine is usually accomplished

**Fig. 4. Here workmen are repainting an Ex-Cell-O thread grinder that has been completely overhauled in shop**

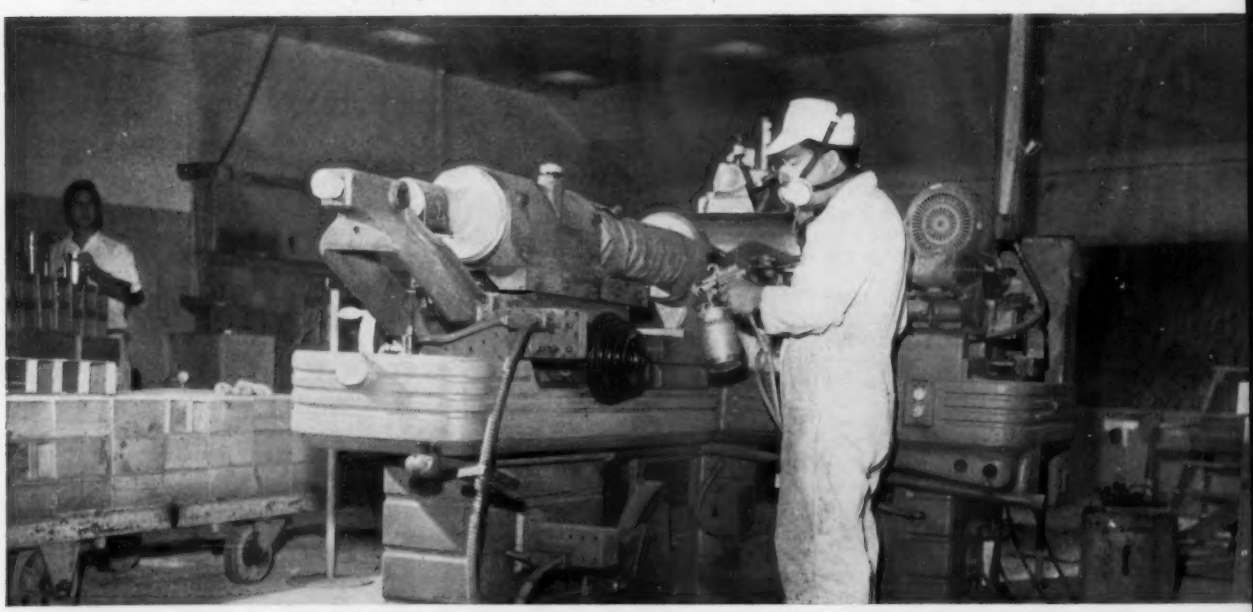


**Fig. 5. Disassembling a Gisholt turret lathe preparatory to checking for defects**

under a contract, and the contractor naturally limits his work to his obligations. Other parts on the machine that may need reconditioning or replacement in the near future are ignored. This may lead to another early repair bill and more down-time.

Douglas' plant engineering decided that once a major machine was turned in for repair, it would be more expedient to dismantle it completely, inspect every part, then replace or recondition all worn parts in a single overhaul operation. Now when one of the machines is returned to the production line, we know it is in good condition throughout and, barring accidents, will give uninterrupted and trouble-free service for years.

Since organization of the in-plant repair shop, and in addition to the time saving involved, it has been found that the work can be done much more cheaply than when it was sent outside. There is no profit added to the price of the new parts that must be installed. The cost of transporting the machines to and from an outside shop has been eliminated. There is also the intangible value of being able to "rush through" a repair job when the machine involved is badly needed on the production line.

The cost of setting up this in-plant major machine unit repair shop was nominal. Floor space requirements were about 50 by 100 ft. Special tooling in the department consists mainly of various surface plates, straight edges, and miscellaneous checking and measuring instruments. Necessary machine work, welding, plating and similar work is routed to and accomplished by associated shops in the plant engineering maintenance department.

Currently, 12 men, including the foreman and assistant foreman, are employed in this department. A very effective system of work handling has been instituted. When a machine enters the department for overhaul, it is assigned to a specific individual who then becomes responsible for the entire job. It becomes his "baby," so to speak, and his pride and reputation is involved, not only in successfully completing the job, but in how the machine operates when it is returned to the production line.

A definite work procedure is followed in the majority of cases. When a machine enters the repair department, the first operation is to disassemble and strip it to its base castings. Then each part is checked for wear, and parts that must be installed new are ordered immediately so that they will be on hand when time for re-assembly occurs. The new parts are procured by a plant engineering purchasing specialist to assure good quality at the lowest consistent price, and to expedite delivery.

After the new parts are ordered, the man in charge of the job begins the reconditioning and refinishing of all parts that will be reinstalled. The heavy castings, such as machine bases, heads, and other major members, are thoroughly cleaned and inspected for cracks with a surface penetrant. The insides of these castings are then given a heavy coating of Glyptal to minimize internal sweating and rusting after they are returned to service. A good quality exterior finish is then applied.

All gears and other machined parts are cleaned thoroughly, then inspected for wear and other faults. Sliding guides, ways, etc., are cleaned and polished. Columns, saddles, knees, and all alignment surfaces are cleaned, checked and scraped to restore original, and sometimes better than original, tolerances. A surface plate coated with red lead is used to check surface smoothness. High speed steel scraping tools and flaking tools are used for this work.

All universal machine heads are completely disassembled, inspected, repaired, and rebuilt as necessary. In general, all bearings are replaced, although in the case of a very expensive bearing it may be reground to size. All motors are removed from the machine and cleaned and checked. All control wiring is carefully inspected.

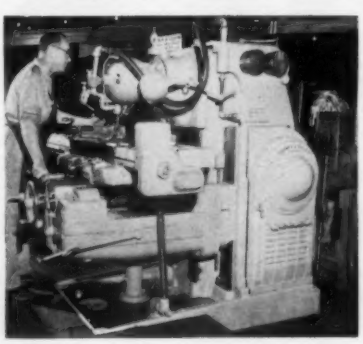
In turret lathe overhaul, all parts are realigned from the same center used when the lathe was made new, and then the hex turrets are drilled to coincide with this alignment. In many cases these re-worked lathes hold better tolerances than when new.

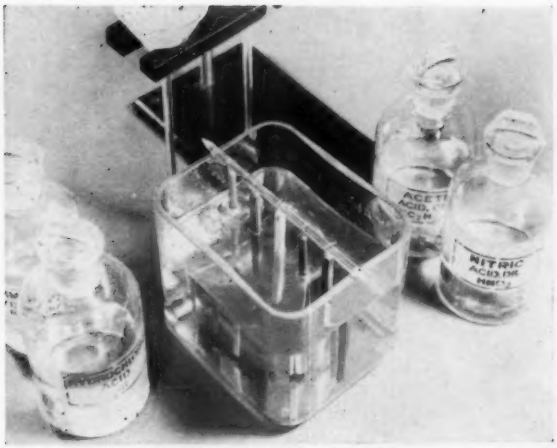
Hard chrome plating is employed to rebuilt worn shafts to size. In a few cases hardened ways may be built oversize just sufficiently to compensate for saddle wear, but as a rule all parts and components are rebuilt to a standard size. This minimizes the possibility of encountering odd sized parts during subsequent overhauls.

Every effort is made to modernize each machine when it is overhauled. New machines of similar design are studied, and, if improvements have been made, these improvements are incorporated in the overhaul model if at all possible. This may require modification or complete rebuilding of certain components, but it has proved to be money and effort well spent. Many machines are equipped with new pressure oiling systems; others with control panels rebuilt to incorporate better and more accurate controls. It is the opinion of plant engineering that periodic overhauls coupled with consistent modernization will keep all plant machines on a par with new equipment.

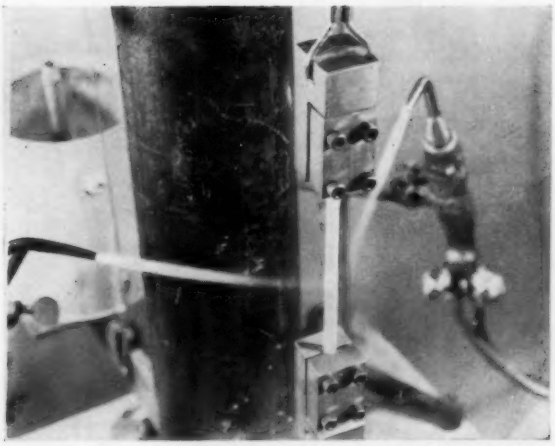
Our plant engineering heavy machine repair department is faced with a peculiar problem in that the Douglas El Segundo plant is engaged almost exclusively in the production of Navy airplanes. Therefore each machine overhauled must meet rigid Navy specifications before it is returned to the production line. Alignment, operation, and accuracy is carefully checked by Navy personnel.

**Fig. 6. Back in service, this mill has been completely modernized, repaired**

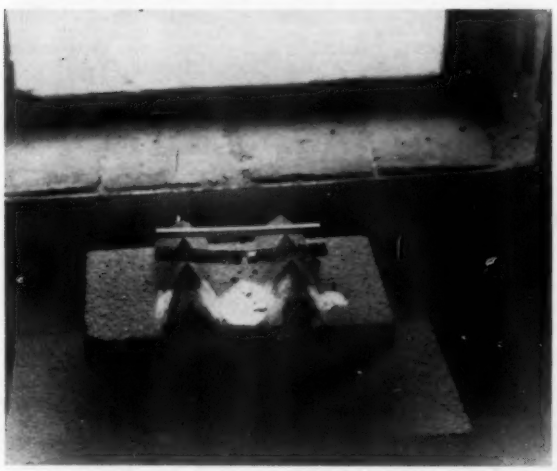




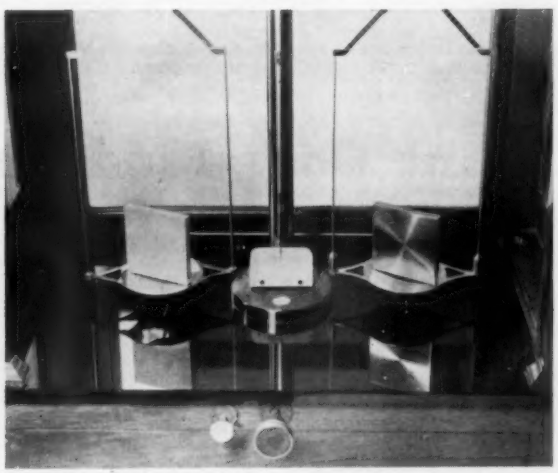
Certain Pyroceram materials have excellent chemical stability, can withstand acid and alkali attacks. The steel, aluminum, copper and magnesium rods were all affected by the aqua regia acid while the Pyroceram remain unaffected



Even under the heat of two acetylene torches and with weights pulling at each end this rod of Pyroceram maintained its strength. Flexural strengths as high as 80,000 psi have been measured on some formulations of Pyroceram materials



According to tests conducted by Corning research Pyroceram has no recorded loss of strength at temperatures as high as 1470 F. This bar is still rigid after exposure to furnace temperatures hot enough to melt copper, cause steel to sag



This Pyroceram formulation is as light as aluminum. Another formulation developed by Corning is actually lighter than aluminum. By controlling batch ingredients and final heat treatment, different physical properties can be produced

# Pyroceram — Light, Hard and Acid-, Heat-, Alkali-Resistant

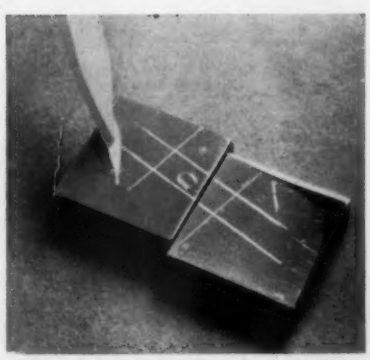
LIGHTER THAN aluminum, harder than high-carbon steel, nine times stronger than plate glass, unharmed by strong acids and alkalis, non-porous —these, in a nutshell, are properties of a new basic material just announced by Corning Glass Co., Corning, N. Y.

Thus far more than 400 different compositions of Pyroceram have been developed. It can be tailor-made with thermal expansions ranging from slightly negative to high enough to match those of heavy metals. It can have electrical insulating properties superior to those of the best dielectric ceramics. It can be made opaque or transparent.

Experimental Pyroceram compositions have flexural strengths as high as 60,000 psi, and, according to Dr. William H. Armistead, director of Research and Development for Corning, certain types of the material keep their strength at temperatures up to 1300 F.

"Unlike most high-strength, high-temperature, crystalline materials," said Dr. Armistead, "Pyroceram has great flexibility in forming. It can be made into large or complex shapes by any of the glass-forming techniques. It is adaptable to mass production techniques and can be pressed, drawn, blown, rolled and centrifugally cast."

Commercial quantities of the material are not yet available. However, inquiries on possible uses (such as for curtain walls in buildings) should be directed to Dr. Armistead.



Harder than steel or brass, Pyroceram scored both materials in scratch test

**These buildings make up the Heppenstall plant in New Brighton. Manufacturing building, left; two-story sales department office building, right center; and the engineering department quarters can be seen in single story building at far right**

# Plant Goes Modern—Twice

## Three-Building Plant "Rearranged" To Suit the Product

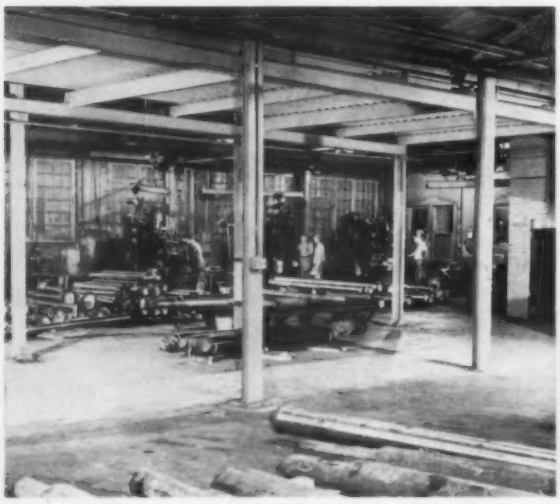
ORIGINALLY BUILT and equipped as a forging plant, two extensive renovations have "rebuilt" the New Brighton, Pa. plant of the Heppenstall Co. since it was acquired by that company late in 1950.

Consisting of a manufacturing building covering more than 60,000 sq ft, and a two-story office building, the plant was purchased by Heppenstall to supplement the forging capacity of its main plant in Pittsburgh. To permit greater production and to provide better working conditions, a number of major improvements were made, including an increase of furnace capacity, installation of a new quenching system and modernization of other facilities.

Five years later, as part of a company-wide expansion program, Heppenstall decided to convert the plant for the production of its tongs and other materials handling equipment, formerly made in a section of the Pittsburgh plant. This required that the forging machinery be moved out and other machinery installed, and that a part of the plant be rebuilt to provide modern quarters for the engineering and sales departments of the materials handling division.

When first acquired by Heppen-

**THEN** **First conversion, modernization of an existing forging plant, resulted in machine shop layout and equipment**



**NOW** **Second modernization changed machine shop area into windowless, well-lighted engineering department office**

**THEN** Forge shop after first remodeling. Forge in rear, furnaces at right. The new car bottom furnace is far right

**NOW** Forge shop, after conversion to metal fabricating operation. Furnaces removed, floor leveled, heating improved

stall, the plant included a 1500-ton capacity forging press, four forge heating furnaces, five heat-treat furnaces and four overhead cranes for lifting the forgings. Also included on the site were a small machine shop, a stock room and other facilities. To increase output, one of the forging furnaces was removed, and replaced by two modern car-bottom type forge heating furnaces. An oil quench tank was installed, with a cooler and pumps for circulating the oil at 700 gpm.

One handicap in the modernization program was that the New Brighton plant lacked melting facilities for producing its own open hearth steel. To overcome this lack, and at the same time utilize surplus melting capacity at Pittsburgh, a unique shuttle system was set up between the two plants, more than 30 miles apart. Hot ingots were loaded on trucks in specially insulated containers and hauled to New Brighton without losing more than a fraction of their heat. Put in furnaces there, they were soon at forging temperature.

The more recent changes in the plant were part of an expansion program begun in 1954. A plant usage study showed that the New Brighton plant could best be used for the production of materials handling equipment—facilities which were producing this equipment in Pittsburgh were no longer adequate. For most effective operations, the sales and engineering departments of the division were moved from the main office building in Pittsburgh, to consolidate them with the manufacturing departments.

An existing office building was large enough to accommodate the sales department and a reception room, but it was necessary to convert a former machine shop to provide quarters for the engineering department. A new unit was built to connect this with the office building. The windows in the machine shop were covered, and fluorescent lighting installed to provide uniform light levels at all times.

Changes were more extensive in the manufacturing building. The forging press, forging furnaces, two of the five heat-treat furnaces and two of the four cranes were removed and transferred to other plants. The existing concrete floor was torn out, and a new one laid at a lower level.

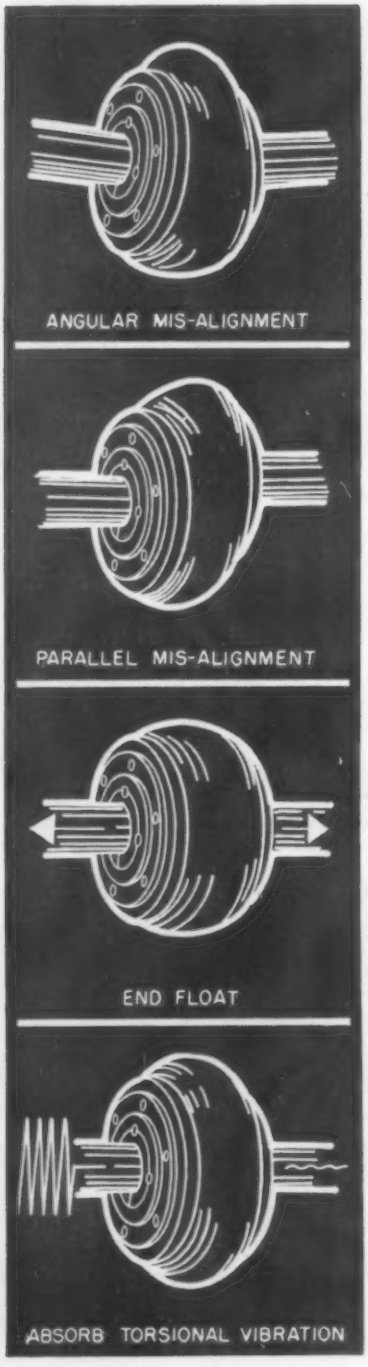
Present operations are on a flow line basis, starting with the cutting of rolled steel plate to the desired shape, through the subsequent steps of heat-treat, machining and testing.

**THEN** Second section of manufacturing area, originally used to machine forgings. Rear of furnace bank is at left

**NOW** Conversion for manufacture of handling equipment produced this layout. Floor was lowered at column line

# This Coupling Flexes to the Condition

## Mis-Alignments Are No Problem for This Rubber Tire Coupling




ABILITY TO HANDLE angular mis-alignment, parallel mis-alignment and end-float, and in any combination, is only one of the advantages claimed for this new flexible coupling, known as Para-flex. The coupling, made by Dodge Manufacturing Corporation. Mishawaka, Indiana, has a flexible member which cushions shock loads and diminishes torsional vibration, thus protecting both the driver and the driven machine.

Heart of the coupling is a tire with synthetic tension members bonded together in rubber. In fact, this new coupling has been made possible by the technological advance in the manufacturing of modern automobile and truck tires, engineered to carry tremendous loads at high speeds and stand terrific shocks. The four-way flexing body of the coupling operates with the simplicity and dependability of a modern tire.

The coupling consists of the flexible tire clamped between two hubs which are mounted on the shafts to be coupled. The flexible member is held between the flanges and clamp rings of the hubs.

Both hubs of the coupling are machined to take tapered bushings. These give the equivalent of shrunk-on fit on the shaft and permit quick and easy application to shafts of different diameters without costly reboring.

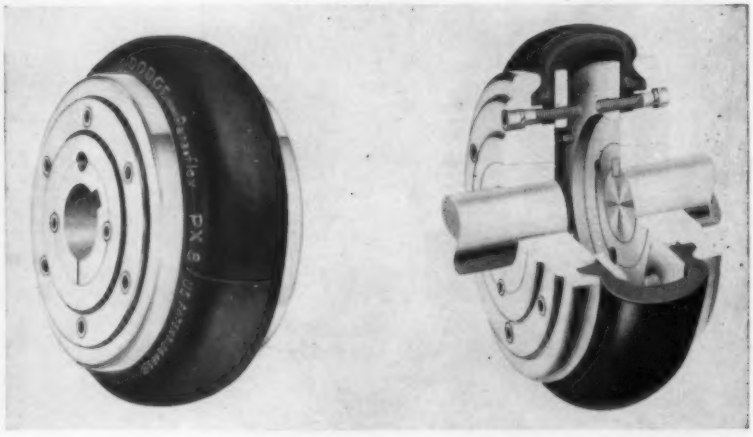
The tire has a transverse split molded into it, which permits easy installation and makes replacement possible without moving the driver or driven machine. To make a change, it is only necessary to loosen the cap screws enough to allow removal of the tire and to fit a new one in place. Even in very confined spaces this simple operation can be accomplished in a few minutes.

According to Dodge engineers, the coupling will take angular mis-alignment up to four degrees, parallel mis-alignment up to ⅛ in. and end-float up to 5/16 in.—contingent upon the size of the coupling and the duration of the conditions—or it will take all of these simultaneously.

The resilience of the flexible member cushions shocks to a remarkable degree, smoothing out the load for both driver and driven machine. Torsional vibration developed by internal combustion engines, the amplitude of which increases at critical points in the speed range, is absorbed to a great degree.

Because there is no metal-to-metal contact in the coupling, it requires no lubrication. No maintenance or regular inspection for lubrication is needed. Safety is promoted by its flush design. The coupling is designed to occupy a minimum of space on the shaft. These couplings are available in capacities up to 600 hp at 900 rpm.

**Left: Here are four conditions which this new coupling handles with ease. The reason is the rubber tire flexing member, below, which flexes to the condition**



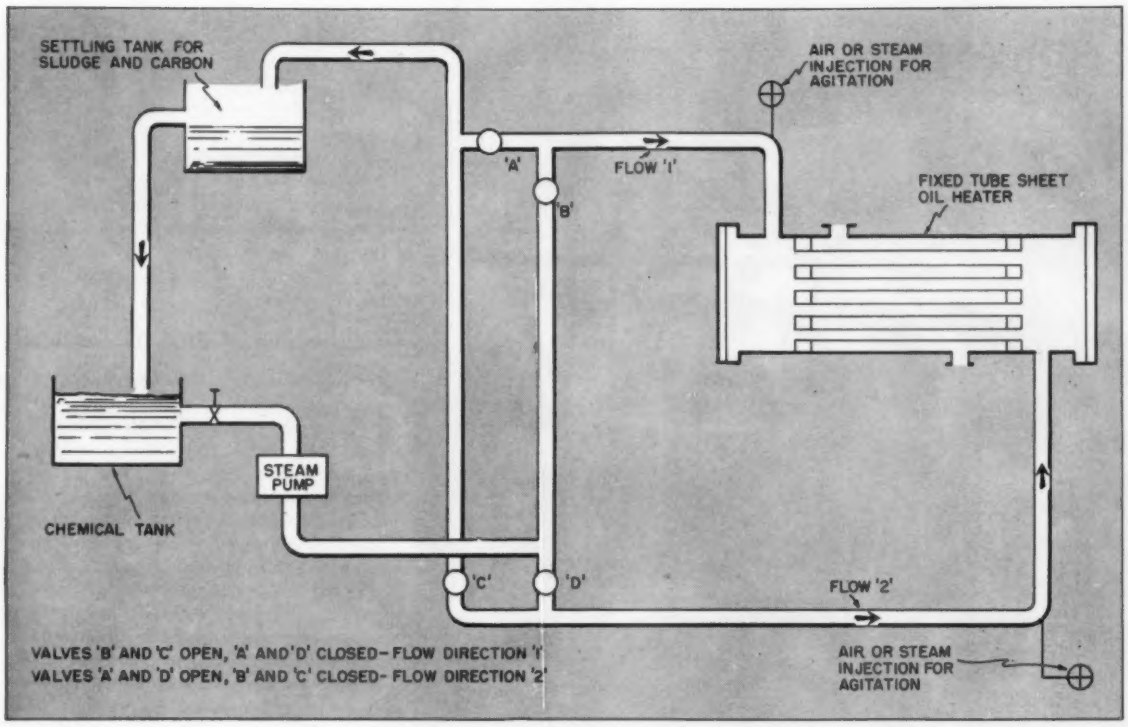

SETTLING TANK FOR SLUDGE AND CARBON
AIR OR STEAM INJECTION FOR AGITATION
'A'
FLOW '1'
FIXED TUBE SHEET OIL HEATER
'B'
STEAM PUMP
CHEMICAL TANK
'C'
'D'
FLOW '2'
VALVES 'B' AND 'C' OPEN, 'A' AND 'D' CLOSED- FLOW DIRECTION '1'
VALVES 'A' AND 'D' OPEN, 'B' AND 'C' CLOSED- FLOW DIRECTION '2'
AIR OR STEAM INJECTION FOR AGITATION

Fig. 1. Hook-up for chemical cleaning of tubular heater. Method, preferred to mechanical cleaning, avoids damage to tubes

# ABC's of Fuel Oil Heaters

## Proper Selection, Good Maintenance Mean Good Service

By R. J. BOSK, Special Projects Engineer, The Griscom-Russell Co., Massillon, Ohio

KNOWLEDGE OF WHY certain construction features are incorporated in the design of fuel oil heaters will help the user select the right equipment. Good operating and maintenance procedures will insure the most efficient service from the equipment.

Several designs of fuel oil heaters are available and will be discussed.

*Fixed Tube Sheet Heater.* Simplicity of design is one of the features of a fixed tube sheet heater.

This unit consists of a shell with two fixed tube sheets, into which the tubes are expanded. An impact baffle at the shell inlet prevents steam impingement against the tubes and effectively distributes the steam to avoid any dead spaces in the shell. Segment-cut baffles direct the flow of steam through the shell, to provide adequate support for the tubes. Partitions in the head at each end direct the oil through the tubes.

In operation, the oil to be heated is passed through the tubes. Thermal strains within the tubes are avoided by shutting off the steam after shutting off the oil, not before. Since overheating the oil causes a coke deposit on the tube surface, the steam should be shut off immediately after the oil flow has been stopped.

Straight tubes facilitate cleaning out the accumulation of gummed oil that may collect on the inside of the tubes. The covers can be removed from the heads of the units, the tubes may be cleaned without breaking any of the oil or steam connections.

To insure permanent tightness, tubes are expanded in both tube sheets, with grooved tube joints. The multipass arrangement and great number of small tubes with large total heating surface provide exceptional heating effectiveness and overload capacity of a small compact unit.

Sturdy construction throughout will assure dependability with a very small maintenance expense. A welded tube sheet to shell reduces maintenance by reducing the number of gasketed joints.

*Longitudinal finned tube fuel oil heater.* This type of unit consists of a few simple parts. The inner element is the longitudinally finned pipe. This pipe has metal ribbons which form fins, mechanically bonded or welded to its outer surface. Two of these finned tubes are connected by a return bend and the unit assumes the shape of a U tube. A shell pipe surrounds this element so that the unit is simply a finned pipe within a pipe. Nozzles are furnished on the shell to allow the oil to flow around the finned element and connections are made to the element to allow passage of steam.

With a very viscous oil, it is often desirable to induce turbulence in the

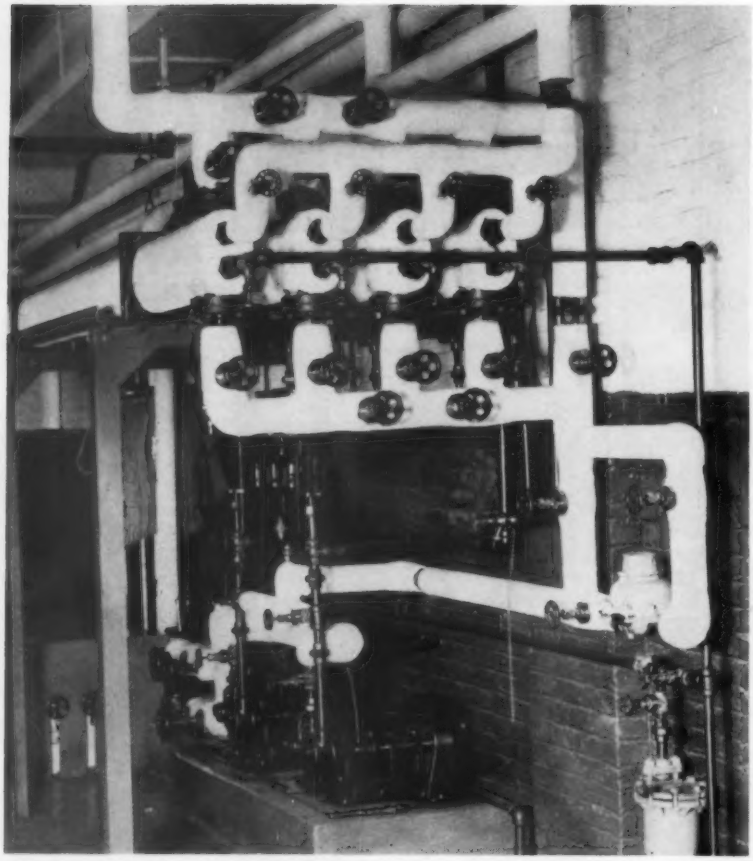


**Fig. 2. Installation of longitudinally finned tube heaters. Such arrangement is versatile, providing for cutting individual sections in or out of service as required**

oil to increase the rate of heat transfer. This turbulence can be effected by cutting the fin transversely and twisting slightly at regular intervals.

This type of unit used in banks is ideal for flexible oil heating installations. At fractional loads, the units can be cut in and out of the line to better maintain constant oil temperatures. Also, at partial loads, the units not in use can be inspected or cleaned without shutting down the entire oil heater installation.

Since no internal joints are used, no leakage can occur between the oil and steam. The lower surface temperatures inherent in this type of finned unit reduce the cooking tendency of the oil. The oil passage is unobstructed, having no baffles in which dirt and sludge can accumulate.

Another feature of this versatile heater is the simplicity of maintenance. Most of the finned elements can be handled by two men, therefore no hoist or crane facilities are needed.

The heating elements can be removed by removing the rear cover, and releasing the front end closure. The oil connections are not disturbed when the heating surface is removed. All parts are accessible by the use of standard wrenches.

## Selection of Fuel Oil Heaters

A fuel oil heater will last many years, therefore a complete study of the requirements is justified, before the unit is purchased.

To select the proper unit, the fuel oil heater manufacturer needs the following minimum information:

1. The total quantity of fluids entering the heater in lb per hr.
2. Specific heat, thermal conductivity, viscosity and specific gravity of the type of fuel oil used in the appropriate units.
3. The inlet and outlet temperatures of the fuel oil.
4. The operating pressures in psi.
5. The allowable pressure drop for each fluid.
6. The cleanliness of the fluid and any factors which may contaminate the fluid.
7. The available space for installation.
8. Data on corrosive conditions which may warrant the selection of corrosion-resistant materials.
9. Whether horizontal or vertical installation is required.
10. The city and state where the unit will be installed.

The selection of material is dependent on the operating conditions, and is usually determined by the manufacturer. However, if the user is aware of a corrosive atmosphere, electrolytic forces, or anything which may influence design of the heat exchangers, he should, of course, advise the manufacturer.

## Maintenance of Fuel Oil Heaters

Frequently and at regular intervals, the user should observe the interior and exterior condition of all tubes and keep them clean. Neglect in keeping all tubes clean may result in complete stoppage of flow through some tubes, with consequent overheating of these tubes as compared to the surrounding tubes. Such overheating can cause severe expansion strains and leaking tube joints.

Fuel oil heaters are subject to fouling and should be cleaned periodically. A light sludge on the tube greatly reduces its effectiveness. A marked increase in pressure drop and reduction in performance usually indicates cleaning is necessary.

However, the unit should also be checked for air or vapor binding since this may also cause the reduction in performance. Since the difficulty of cleaning increases rapidly as deposits increase, the intervals between cleanings should not be excessive.

In cleaning a tube bundle, tubes should not be hammered on with any metal tool. If it is necessary to use scrapers, care should be exercised to see that the scraper is not sharp enough to cut the metal of the tubes. Circulating hot wash oil or light distillate through the tubes or shell at a good velocity will effectively remove sludge or other similar soft deposits.

Some cleaning compounds on the market may be used to advantage for removing sludge or coke, if hot wash oil or water does not give satisfactory results. Certain qualified organizations will check the nature of the deposit being removed, furnish proper acid solutions containing inhibitors and provide equipment and personnel for a complete apparatus and piping cleaning job. If none of the above described methods is effective for the removal of coke or other deposit, mechanical means may be used.

Do not attempt to clean tubes by blowing steam through individual tubes. This overheats the tubes and results in the same severe expansion strain and leaks as for plugged tubes.

The finned element of the longi-

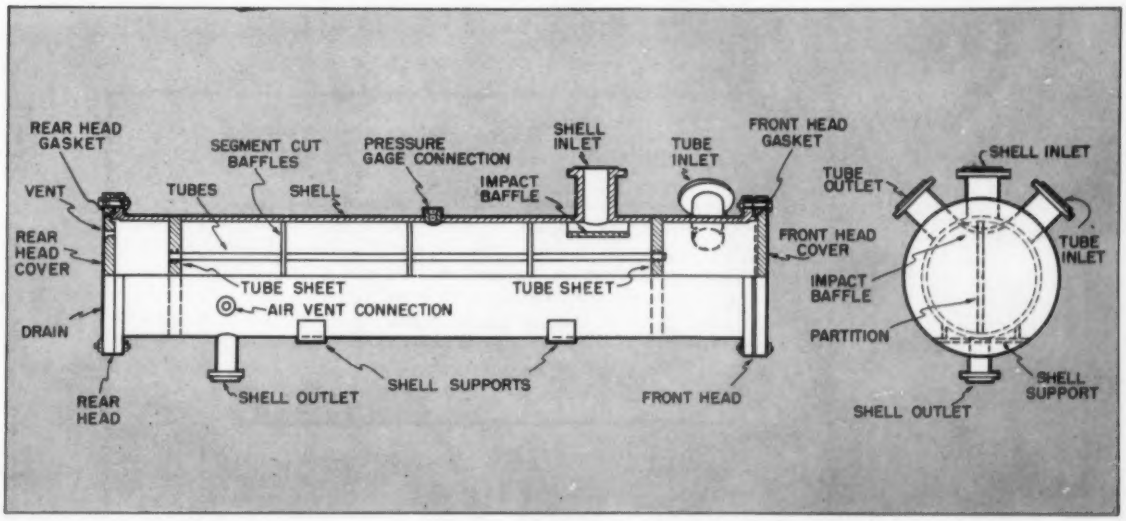
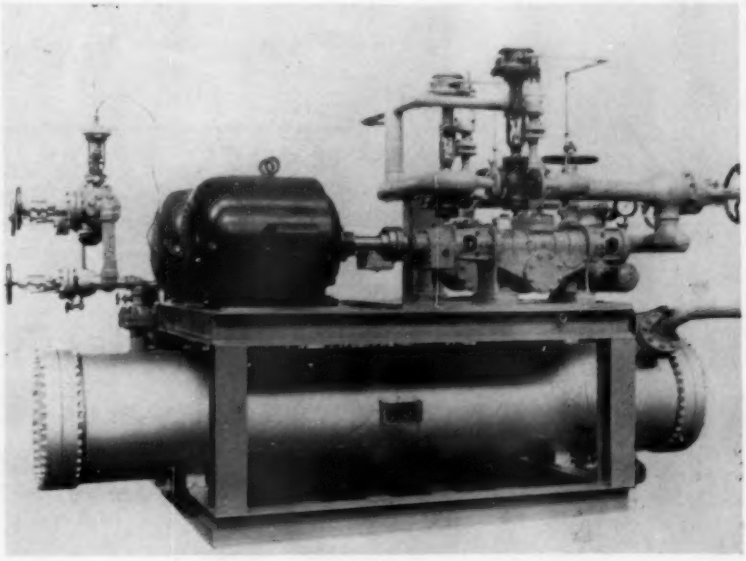



**Fig. 3. (Above) Diagram of fixed tube sheet heater shows simplicity of design. In operation, oil passes through tubes**

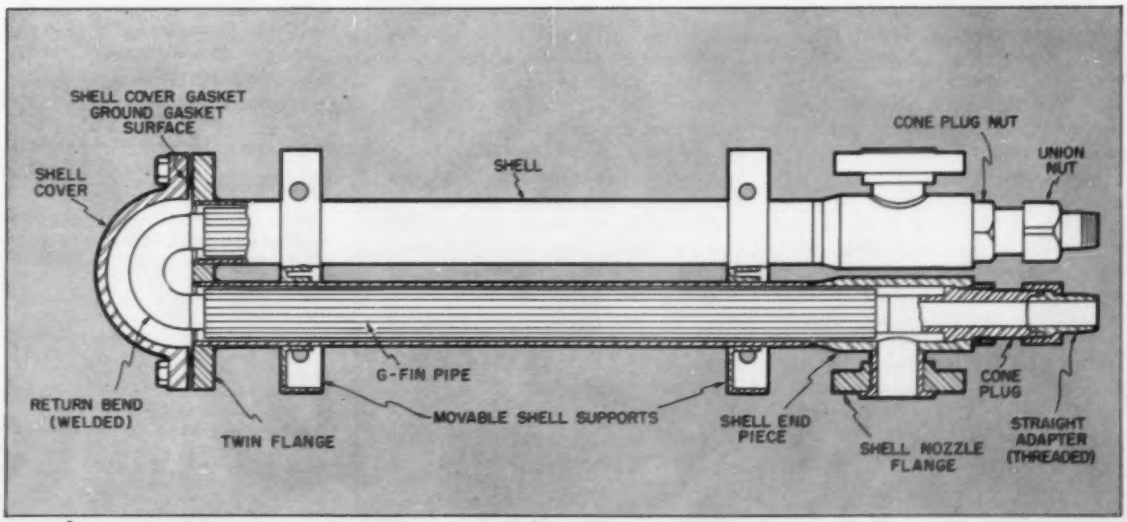
**Fig. 4. (Right) Package unit incorporates fixed tube sheet heater, pumps, meters, gages, controls and piping**

**Fig. 5. Longitudinally finned tube fuel oil heater. Return bend is welded if interior access at bend is not needed**



tudinal finned fuel oil heater can be cleaned chemically or by use of a scraper to remove the coke.

It is recommended that when a fuel oil heater is dismantled for any cause, that it be reassembled with new gaskets. This will tend to prevent further leaks or damage to the gasket seating surfaces of the fuel oil heater. Fiber gaskets dry out and become brittle and metal or metal-jacketed gaskets become work hardened. Reuse of these gaskets may provide an imperfect seal or damage gasket contact surfaces.



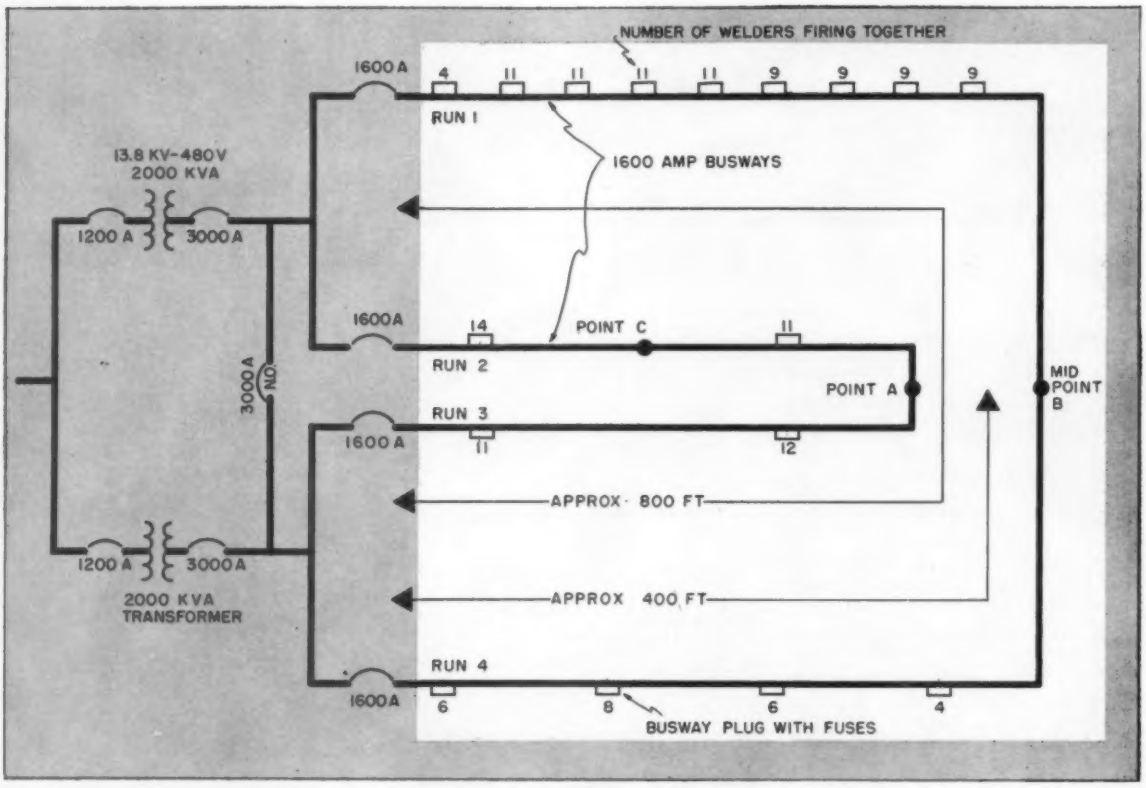



**Fig. 1. Tie connections at points A and B form two separate loops out of the four runs of welder plug-in busway**

# How To Double Welder Bus Capacity

## Parallel Busways, Transformers Feed 500 Welders

**By R. W. DAILEY, Plant Electrical Engineer, Chrysler Corp., Twinsburg, Ohio and L. E. FISHER, Mgr., Systems Application Engineering, General Electric Co., Plainville, Conn.**

WELDING LOADS at Chrysler Corp. plant, Twinsburg, Ohio, are supplied from an unusually heavy welding distribution system. Three double ended unit substations, each with two 2000-kva transformers and with 3000-amp main and tie circuit breakers provide ample capacity to serve the welding equipment.

Each 2000-kva transformer feeds two runs of 1600-amp LVDP busway protected by 1600-amp feeder circuit breakers. The runs are approximately 400 ft long, with the outer end of each run connected to the end of another run to form an 800-ft loop between two of the transformers. With this arrangement the transformers are effectively tied in parallel on the 480 v side by the two parallel runs of 1600-amp busway. Actually the six welder busway loops vary from 507 to 905 ft in total length.

Parallel connected systems have many advantages. With a single large load connected near the input end of either busway, the two transformers will divide the current in the ratio of approximately 60 and 40 per cent. Thus with almost any practical loading around the loops, the transformers will divide the load almost evenly. The voltage drop in the transformers will be greatly reduced as a result of this sharing of the load.

The busway, with four aluminum bus bars per phase, is capable of withstanding the forces of a 100,000-amp short circuit. Using an interlaced arrangement, the four bus bars in parallel for each phase are connected together at every joint. The 10-ft sections have ten openings for attaching bus plugs.

One of the double ended unit substations is shown in Fig. 1. The 65-kva welding transformer loads are in groups with a maximum of 14, distributed across the phases, and fed from fused switch busway plugs. The groups are fired simultaneously by Ignitrons. The total number of groups in run 1 is nine, in runs 2 and 3 is two, and in run 4 is four.

Tests indicate that the "during-weld" current of each 65-kva welding trans-

### The Whole Story —

The survey, "Plant Electrical Problems and Practices," (see PLANT ENGINEERING, June, 1957), revealed considerable interest in electrical distribution systems for heavy welding. In response to this interest we are presenting here some of the high points of a very detailed paper presented at the 1957 Welding Conference in Philadelphia. For the complete story we suggest you contact B. E. Rossi, Journal Editor, American Welding Society, 33 west 39th St., New York, N. Y.

former is 250 amp. All welders will weld for 15 cycles out of each nine seconds with a resultant duty cycle of 0.0277 or 2.77 per cent.

For each part of the system it is necessary to make two separate calculations. First, a calculation is made to determine the ampere rating of the fuse, busway or other element to satisfy the thermal requirement. This is sometimes called the equivalent continuous current. For each group of welders use the formula in which the equivalent continuous current is equal to the during-weld current times the square root of the duty cycle.

As an example, for each group of three 65-kva transformers, one per phase, the single phase during-weld current is 250 amps. Three times this, 750 amps, when divided by the square root of three (1.73) results in a three phase current of 433 amps.

### Circuit Protection

The square root of the duty cycle (0.277) is 0.166. Multiplying by the three phase during-weld current of 433 amps, we find the equivalent continuous current to be 72 amps. Select a fuse or molded-case circuit breaker about 25 per cent larger than this value in order to prevent nuisance blowing or tripping. This safety factor is not necessary for a busway, cable, transformer or magnetic circuit breaker.

Fuses or circuit breakers selected to satisfy the thermal condition must also be checked to make sure they will carry the during-weld current. From the time current curves of the fuse or circuit breaker, determine the time required for the fuse to blow or the circuit breaker to trip when carrying the during-weld current. It is important to make this check to make sure the protection will not operate during the 15 cycles that the current flows. To allow a little safety factor, it would be well to increase the size of the fuse, if in any case, the fuse at this magnitude of current blows in less than 30 cycles.

As an example, a 200-amp fuse previously calculated to satisfy the thermal requirements for six welding transformers, will carry the during-weld current of 866 amps for about seven and one half seconds. Obviously there would be no danger of the fuse blowing at this magnitude of current in the during-weld time, which is 15 cycles.

For the feeder circuit breakers protecting the busway loop one and four which has 13 groups of welders, it is determined from the bottom scale of Fig. 2 that the total number of welders firing simultaneously for a duty cycle of 0.0277 will be 4.3. Assuming that these groups have 12 transformers each, the equivalent continuous current will be 1732 amps.

The probability curve indicates that 4.3 of these units will fire simultaneously for a total current of 7450 amps. With the known locations of the large welding presses around the loop, not more than 65 per cent of this total current, about 4900 amps, will pass through one feeder breaker. The total of 7450 amps, would require almost 10 seconds to trip the 1600-amp feeder circuit breaker so there is little danger of its tripping in 15 cycles.

Calculating the voltage drop of busway loop 1 and 4 we will refer to the upper scale of the probability curves, Fig. 2. We find the probable number of other welders firing simultaneously with the 13 welders in this group for a duty cycle of 0.0277 is 3.3. Since the maximum welder group containing about 12 welding transformers draws 1732 amps, the total maximum during-weld current will be 3.3 times 1732 or a total of 5720 amps.

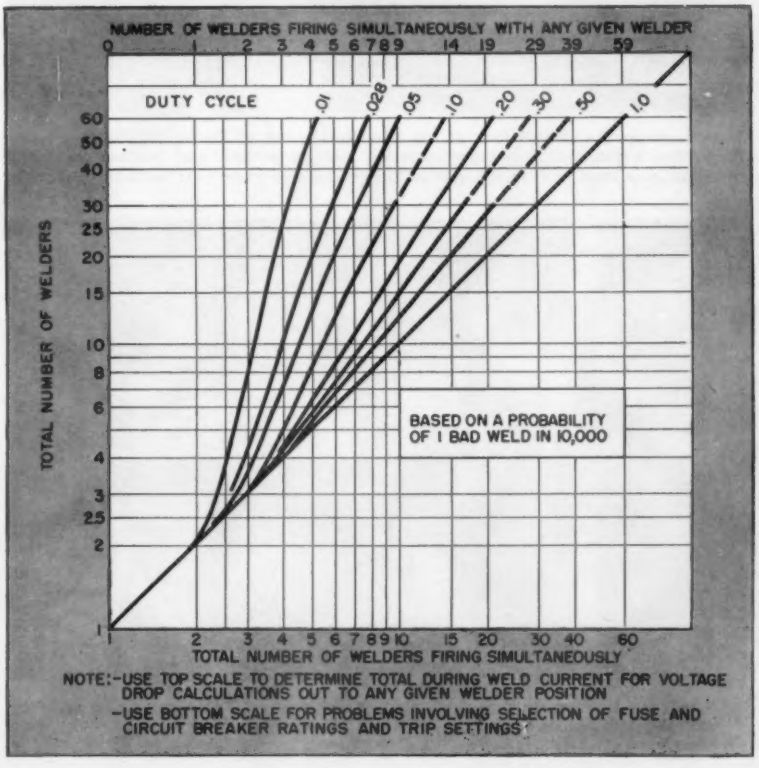
Assuming that these 3.3 welders, which happen to be firing together, are located out near the mid-point of the loop, there would be 2860 amps flowing in each half of the loop. The per cent voltage drop of the 1600-amp busway selected for this application is 0.00032 per cent per amp per 100 ft with the entire load at the end of the run. Thus the per cent voltage drop in this busway is 0.00032 times 2860 times 4 equals 3.66.

Voltage regulation on systems with welder loads can be improved by the use of series capacitors. This equipment can exactly nullify the voltage drop in a transformer or busway and the voltage drop will be nullified for all values of load current from zero to maximum. This is true only if all the current which passes through the transformer or busway also passes through the capacitor.

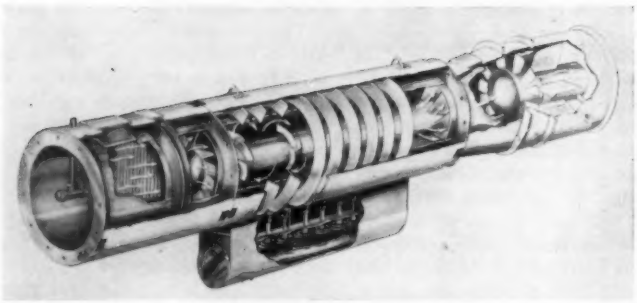
Only a small amount of capacitor kva is required to nullify the voltage drop in transformers or busways, since the voltage drop in these devices is only 5 or 10 per cent of the total voltage. If all the load is connected at the end of the feeder, a capacitor can be selected so that the voltage at the end remains unchanged for all values of load from no load to full load. It is evident that the voltage level varies along the length of the run.

Where loads are distributed along the length of the run it is not possible to select series capacitors that will completely nullify the voltage drop at all points along the run. One can be used to hold the voltage level constant at about the one-third point in the run, but there will be a voltage rise at the input end and a drop at the output end about half the normal drop.

**Fig. 2. Probability curves for determining number of welders firing simultaneously**

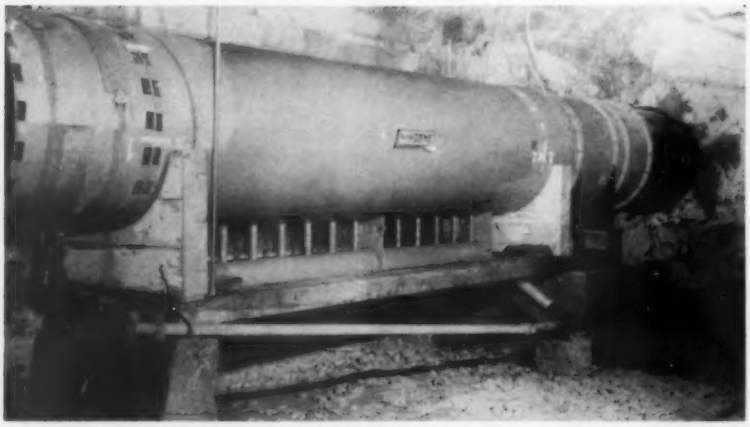

NUMBER OF WELDERS FIRING SIMULTANEOUSLY WITH ANY GIVEN WELDER
0 1 2 3 4 5 6 7 8 9 14 19 29 39 59
DUTY CYCLE
.01
.028
.05
.10
.20
.30
.50
1.0
TOTAL NUMBER OF WELDERS
60 50 40 30 25 20 15 10 8 6 4 3 2.5 2 1
BASED ON A PROBABILITY OF 1 BAD WELD IN 10,000
2 3 4 5 6 7 8 9 10 15 20 30 40 60
TOTAL NUMBER OF WELDERS FIRING SIMULTANEOUSLY
NOTE:-USE TOP SCALE TO DETERMINE TOTAL DURING WELD CURRENT FOR VOLTAGE DROP CALCULATIONS OUT TO ANY GIVEN WELDER POSITION
-USE BOTTOM SCALE FOR PROBLEMS INVOLVING SELECTION OF FUSE AND CIRCUIT BREAKER RATINGS AND TRIP SETTINGS

Contaminated air enters the collector through the mixing section which contains a water spray and an impingement element. Central part of the unit is a water elimination section with, first, turning vanes and part of unit contains vaneaxial fan

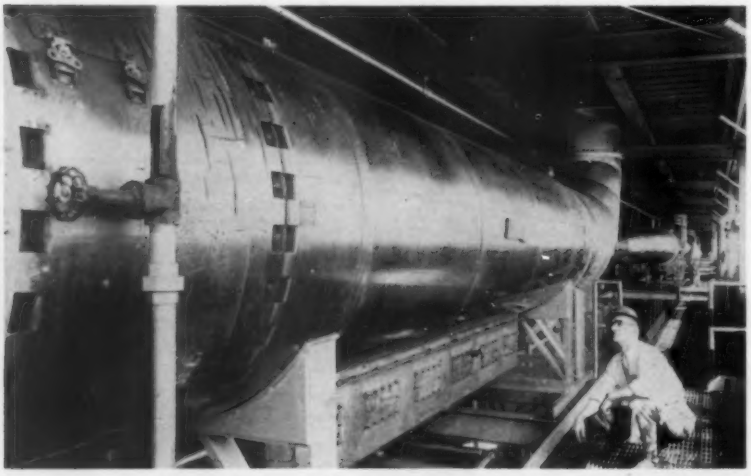


# Here's Microdyne—

## In-Line Dust Collector Gets Field-Tested At Three Locations



This underground installation at an Anaconda mine in Butte, Montana, collects dust from a conveyor, conveyor transfer, storage pockets and loading platform. installation is used both in the ventilation system and to recover valuable materials



At Allegheny Ludlum Steel Corporation's Brackenridge, Pa., plant a new grinding department was put into operation recently. Collecting dust from a bank of seven grinders are four Microdynes collector units each having a capacity of 48,000 cfm

PROTOTYPE MODELS of a new dust collector have been working at their designed tasks in three areas.

1. At the Butte, Montana, mines of The Anaconda Company one of these prototypes has been solving problems in ventilation and material recovery.

2. At Allegheny-Ludlum Steel Corporation's huge Brackenridge plant near Pittsburgh, four of these collectors, called Microdyne by their maker, Joy Manufacturing Company, are bringing about effective dust control on a new grinding operation.

3. Another unit is at work 1300 ft beneath Upper Michigan's iron-mining Marquette range.

The Microdyne is a wet, inertial type collector with an efficiency, states the manufacturer, of 99-plus per cent particles of five microns or greater.

It is a cylindrical device as shown in the cutaway drawing at the top of the page—having two essential parts: a mixer and an eliminator section.

The air and its entrained water-enveloped dust pass through turning vanes as they enter the eliminator section. These vanes impart a helical motion which, in turn, imparts centrifugal force to the particles and to the water. The dust-laden water is captured at the periphery of the eliminator section in blind louvers which are connected to a disposal sump at the bottom of the unit.

If sufficient pressure to drive the gases is not available ahead of the Microdyne, a vaneaxial fan may be attached at the rear of the unit.

### Want More Information?

If you would like additional data on this new collector drop a line to the Editor, PLANT ENGINEERING, 308 East James St, Barrington, Ill., or use one of the postage paid cards elsewhere in this issue. Just ask about "Microdyne."

**Fig. 1. In-floor conveyor does not mind working outdoors—steam pipe underneath protects it from freezing in cold weather**

# Conveyor Keeps Production Moving

## Hot, Cold, Wet or Dry—Makes No Never Mind To It

PARTS WEIGHING as much as 4000 lb are fabricated and assembled into bulldozers and bullgraders at International Harvester Company's Tractor Works in Chicago, Ill.

To move these parts smoothly and efficiently through the final stages of cleaning, painting, drying and storage, Link-Belt Company has furnished a heavy duty in-the-floor Trukveyor system—an unusual application of the endless chain conveyor system commonly used in moving four-wheel platform trucks through warehouses and freight terminals.

Unusual facts that had to be taken into consideration in designing the system were that the conveyor would be subjected to heat and would have to operate both in and out of doors. Where the conveyor runs out of doors, the track section is equipped with a steam pipe below the chain to keep the trough free of snow and ice. Ability to make smooth turns with unwieldly loads and thus provide operating flexibility leaving the production area free of obstructions also had to be considered.

Link-Belt variable speed drives regulate conveyor travel speed from two to 10 feet per minute. Normal running speed on the International Harvester installation is deliberately kept down to allow each worker enough time to perform his phase of the work efficiently, resulting in improved concentration on particular aspects of the work.

Furthermore, trucks are spaced far enough apart so that when additional time is needed, individual trucks can be disengaged at any operation for a short period, and then re-engaged to continue through the process. Disengaging a truck is simply accomplished by lifting the front pin with the aid of a side lever on the truck. Engaging trucks in the conveyor is similarly accomplished by lowering the pin into the floor slot. A back-end stabilizing pin on each truck assures true tracking.

The system runs continuously throughout the work day.

This installation at International Harvester is 535 ft long and consists of an endless strand of rivetless, heat treated chain with towing attachments spaced on 6-ft centers and idlers spaced on alternate 6-ft centers. The chain and attachments operate in 3-in channel track, driven by a variable speed drive unit. The system was laid out by Link-Belt engineers and International Harvester installed the concrete and electrical work.

Four sizes of crawler tractors, when combined with dozer and grader blades, track frames, C frames, trunnions, struts, push arms and other components, give the machines the familiar dozer and grader look. In addition, there are the many parts and fittings that multiply their effectiveness. These devices are termed "hobernockels" by the workers. Fitting hobernockels on to graders and dozers constitutes a substantial part of total production.

Twenty-five heavy duty, special purpose Y frame, A frame, U frame, and flat bed special fixture trucks, designed by International Harvester engineers, accommodate large and small hobernockels and carry them through the following sequence of operations:

Parts are loaded onto truck by over-

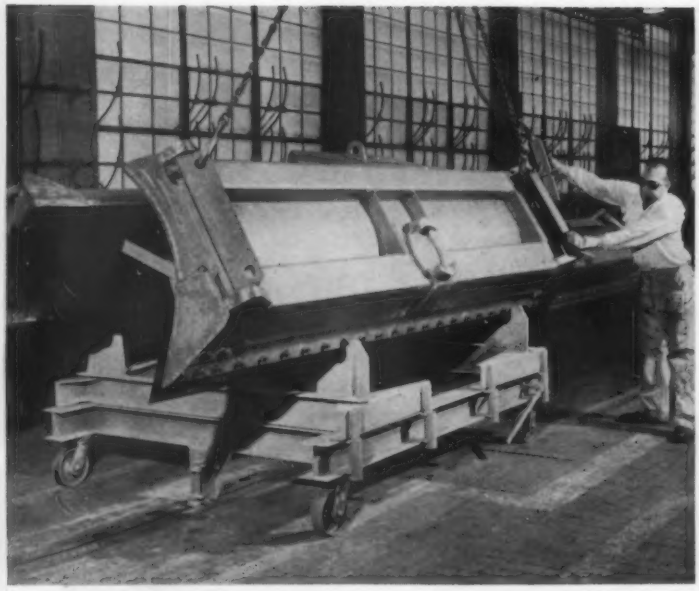


Fig. 2. Parts are loaded on a special truck attached to the conveyor

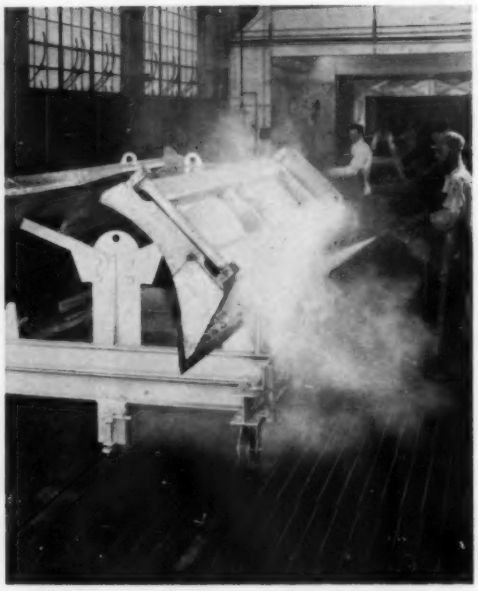


Fig. 3. Still on conveyor, parts are steam cleaned

head cranes. The truck is engaged in the conveyor which tows it to a cleaning area where parts are washed with soap solution and steam and air dried. From the cleaning area, the truck passes to a paint spray booth where parts are painted. Completely painted parts are then moved into a drying tunnel that has an ambient temperature of 250 F. From the drying tunnel, parts are taken out of building for cooling and unloading by yard crane and stored. The trucks then return to building and travel through another cycle.

Ordinarily, movement of these heavy parts would require a crew of men following through each step of the operation—an unwieldy, time consuming job. With a conveyor used in the final stages, these heavy parts are now loaded onto special fixture trucks and the time saved is advantageously used.

Overall manufacturing steps are unusual, in that large and heavy steel plates, similar to those used in railroad car manufacture or in wartime tank production, are put together by using almost every type of welding process known. One grader blade, for instance, weighs approximately 4000 lbs when assembled, and is nearly 14 ft in length and stands 4½ ft high.

General level of precision requirement on all these parts is high, but a manufacturing operation of this type cannot proceed on the continuous assembly line basis that characterizes many of International Harvester's production jobs. Work is so heavy on these large units that straight-through production would not be practical. As a result, production proceeds on a cyclical basis.

Fig. 4. Pusher arms are hauled through paint booth

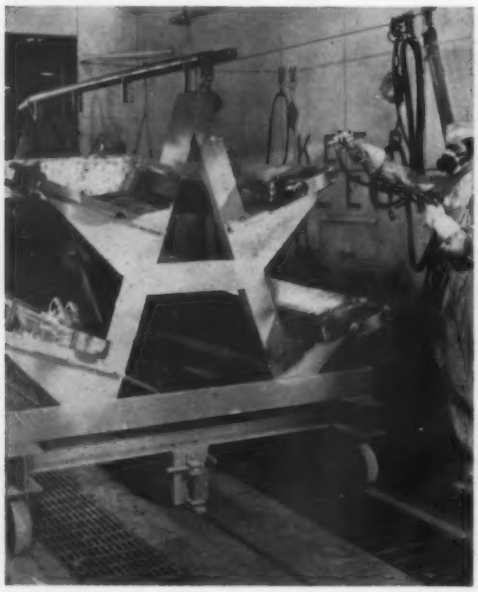


Fig. 5. Conveyor travels next through paint drying oven at 250 F

# What Helps, Hinders Pump Suction?

## Consider All the Facts Before You Blame the Pump

It could, of course, be the pump . . . But, in many cases, the fault may be because of bad suction conditions . . . You may be, unintentionally, reducing suction pressure . . . If this should be the case, here's what you can do to correct it

By R. K. GROBHOLZ, Worthington Corp.

DOES THIS SOUND familiar? "That pump you delivered last week is no good. Sounds like it is falling apart. We have tried everything under the sun to stop the racket, but it still makes like a meat grinder. Get down here and fix it or I am shipping it back in the morning. And, say, you sold it to me for 75 gpm—I'm lucky if the pump puts out half of that."

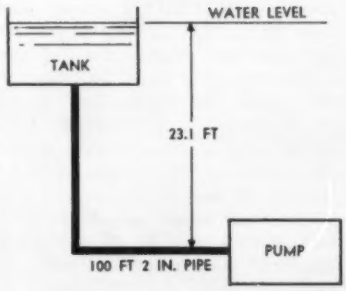
Instructions to the service engineer might be: "Looks like poor suction conditions. See where they get their water. Check the size and length of their suction line. Based on past experience, we know that more reciprocating pump headaches come from bad suction conditions than all other complaints put together."

And what was the condition at the trouble spot? Sure enough, a budget-minded pipefitter had run over 100 ft of one inch pipe from the suction tank to the pump. This only added to their trouble because the size of the pump inlet was four inches. This small line just did not have enough flow area to handle the amount of water the pump was supposed to deliver. Starved suction valves hammered and clattered and, of course, the pump never filled with enough water to supply the rated flow.

To avoid a similar situation in your plant, here are several suggestions of what factors to consider to get enough pump suction.

Before going any further, let's get one point clear. Nothing can "suck." Liquid has to be pushed. If you lower the pressure in a drinking straw by inhaling, higher atmospheric pressure on the surface of the liquid pushes it up to your mouth. If the suction stroke

### Examples Show How To Determine Suction Pressure Available

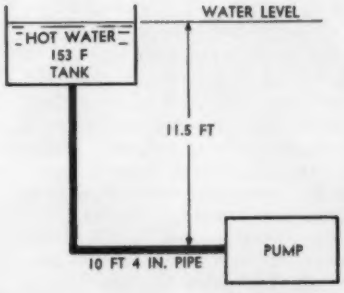



| AIDS SUCTION PRESSURE | | REDUCES SUCTION PRESSURE | |
|---|---|---|---|
| Atmospheric pressure (assume sea level) | 14.7 psi | Vapor pressure, cold | 2.0 psi min. |
| Elevation 23.1 ft ÷ 2.31 | 10.0 psi | Lift | none |
| Booster pump | none | Pipe friction (tables) | 2.0 psi |
| Total | 24.7 psi | Total | 4.0 psi |

Pressure available at pump inlet: 24.7 minus 4 or 20.7 psi
Manufacturer advises pump loss: 10 psi
Pressure available exceeds pump loss; application O.K.

| AIDS SUCTION PRESSURE | | REDUCES SUCTION PRESSURE | |
|---|---|---|---|
| Atmospheric pressure (assume sea level) | 14.7 psi | Vapor pressure (tables) | 4.0 psi |
| Elevation 11.5 ft ÷ 2.31 | 5.0 psi | Lift | none |
| Booster pump | none | Pipe friction (tables) | 0.5 psi |
| Total | 19.7 psi | Total | 4.5 psi |

Pressure available at pump inlet: 19.7 minus 4.5 or 15.2 psi
Manufacturer advises pump loss: 5.6 psi
Pressure available exceeds pump loss; application O.K.



makes the pressure inside a reciprocating pump cylinder lower than any place else in the suction piping, water is pushed toward the pump. There are some things that help shove a liquid along. Others hinder.

Let's first see what would help:

*Atmospheric pressure*—In an open or vented suction tank, the weight of the atmosphere pushes down with a pressure of 14.7 lb (at sea level) for every square inch of water surface. This will help push water to the pump.

*Elevation*—If water at the supply source is higher than the pump, the height is worth a push amounting to one pound per square inch for every 2.31 ft difference between supply water level and pump inlet level. This figure becomes less for liquids that weigh less than water, and more for heavier fluids.

*Artificial pressure*—Maybe a little booster pump can be connected to the big pump suction. If so, the pressure it discharges (pounds per square inch) will move liquid to the main pump. Inexpensive booster pumps are the best insurance you can buy to protect you from poor suction conditions.

Any or all of these conditions help fill a pump, but there are other factors that can offset their help:

*Vapor pressure*—Dissolved air and gases in most liquids are always trying to escape from the surface. This upward force is not very much with cold liquids, but increases with the temperature. The push to the surface is called vapor pressure and directly opposes atmospheric pressure. Handbook data will give you the vapor pressure for water and other liquids, at different temperatures.

When figuring how much vapor pressure reduces suction pressure, play safe and never use less than 2 psi, even if tables or charts say it is less.

*Lift*—Sometimes, instead of being above the pump, a suction tank has to be lower. Then the difference between pump and tank water levels work against us. Atmospheric pressure is usually the only thing available to push water uphill. Again, each 2.31 ft that water must be lifted, takes a push of one pound per square inch.

At sea level, the weight of the atmosphere means that the most pressure available is 14.7 psi. So you will see why 14.7 x 2.31 or 34 ft is the very most we could hope to lift water from a suction supply to a pump. In actual practice 22 to 26 ft is a more realistic figure. Liquids heavier than water can not be lifted that far.

*Pipe friction*—When you push liquid through a pipe, it rubs against the inside pipe wall. This friction robs some of the push that atmospheric pressure or a high suction tank may have added. The longer the pipe, the smaller its diameter and the more liquid you try to push through it, the greater the friction loss will be. The trick is to have enough push to begin with, or so little friction loss that some pressure will be left over when the liquid gets to the pump. If not, then the pump loses capacity, becomes noisy, and wears out quickly.

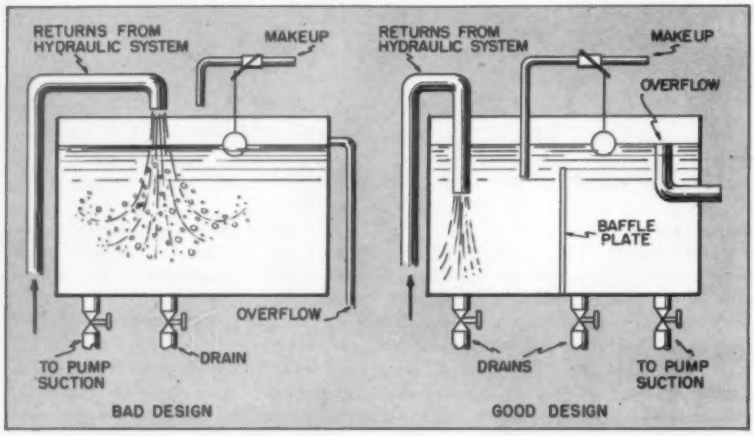
Pipe friction tables cover all standard pipe diameters. These will tell you the friction pressure loss per 100 ft pipe length at various flow rates.

*Acceleration loss*—This sounds tricky, but is not if you just remember one thing. Use a suction air chamber with power pumps over 100 rpm crankshaft speed. Then you can forget it.

All it means is that a power pump piston or plunger speeds up the first part of each stroke and slows down the last part. Without an air chamber, the whole column of liquid in the suction pipe all the way back to the supply source has to speed up and slow down, too, if it is to keep up with the plungers. This takes an extra shove that robs some of the available pressure. An air chamber at the pump inlet provides this shove without affecting other suction conditions.

After considering all these factors, there must be something left over when water gets to the pump. Add up everything that helps push the liquid along. Then add up all the factors that hinder flow. If total push is not greater than total resistance, your pump will not work. You must find some way to raise the suction supply level or else use a booster pump.

If for some reason, your suction tank must be completely enclosed and not even vented, then atmospheric and vapor pressure mean nothing and can be disregarded. The only ways to push liquid along are with an elevated suction tank or a booster pump. Do not try to pull a lift from a closed tank without a booster.




**Proper design of the supply tank is also important in a good suction system. Sketch illustrates a bad design, at left, and features of a good design are shown at right**

## Do We Have Enough Pressure?

However, for purposes of comparison, let's say that we have pressure left over at the pump suction. Is it enough? That depends on the pump design and how fast it is running. Whatever your flow rate, manufacturers can tell you how much pressure you must have left over to push liquid into their pumps. This excess is needed to cover some additional pressure losses inside the pump. Total pump losses are called net positive suction head (NPSH) required. Make sure the pressure in your pipe system left over and available at the pump suction flange is more than the pressure losses the manufacturer expects in his pump. Two examples of how to find what suction pressure is available appear on these pages. That's all there is to it.

One other means of getting this information is to give the pump manufacturer data on your piping, tank elevation, liquid and temperature. He will be glad to do the arithmetic for you. If your pump ever gets noisy or loses capacity, give suction conditions a check before dismantling the unit.

One word of precaution: A good suction system deserves a good supply tank. Water discharging from return and makeup lines not submerged and properly baffled, causes turbulence and creates air bubbles that are pushed along to the pump. Stop this by avoiding the bad features shown in the illustration and build your suction tank the right way.

## Increasing Productivity Spurs Better Lighting Systems

# Lamp and Fixture Choice Broadened

**As the author points out, footcandles are one of the few things that have decreased in price . . . With more costly and more highly skilled labor at work today it pays to give this labor every opportunity to see better, to work more accurately and effectively, with less strain and fatigue . . . Good lighting is one way of accomplishing this . . . On these pages are 12 examples of good lighting**

**By J. L. TUGMAN, Application Engineering, Lamp Div., General Electric Co., Nela Park**

IN THE LAST FIVE years industrial lighting practice has advanced rapidly with new high levels registered for many types of work. Thousands of jobs in a wide range of industries have benefited by this trend. Management gains, too, because easier, safer seeing promotes output potential and reduces costs.

Advances made in lighting represent claims upon this industrial tool to keep pace with the vast increase in production facilities. New machines and new methods introduced by record plant investment have multiplied our fabulous capacity to turn out goods. These new methods have included conspicuous attention to human relations.

### Promotes Better Work

Among the factors for good working conditions that promote good human relations and better work performance, lighting is fundamental. Safety and self respect, as well as production per man hour, generally improve with better seeing conditions. Where the labor market is competitive the better-kept plant may make the difference in getting and holding people.

"The human use of human beings", to borrow a phrase from the title of Prof. Weiner's influential book, is implicit in the movement towards "automation". We do not tend to discuss that subject, except to note that the movement towards automatic processes makes the more repetitious, monotonous jobs the province of the machine more completely.

While the amount of physical effort in production jobs declines, the skill required and the pay per hour go up. The much larger investment per worker which makes these changes possible, also calls for facilities which help the worker to operate and maintain the machines effectively. Workers must exercise their skill and judgment in these new larger responsibilities with reference to light-sight relationships.

New standards of practice show that these often call for much higher levels, many at more than 100 footcandles, some with supplementary lighting, as high as 2000. (Footcandles are one of the few things that have decreased in price during a long period of rising costs.)

To meet this demand new lamps and new application techniques have been introduced in every phase of industrial activities. Today there are choices among desirable alternatives to accommodate the lighting tasks for virtually any operation.

Heavy industry, for instance, can and does frequently choose to regard its lighting with more care than its traditional policy of nominal maintenance has, hitherto, permitted. The inherently dirty operations of heavy industry still oppose the efficient function of lighting systems. Industry still tends to meet these conditions with equipment that will provide some light in spite of the adverse conditions and with minimum servicing.

Since the introduction in industry of filament reflector lamps, about ten years ago, the lighting situation has become steadily improved. The reflector lamps, with their internal control of light and their resistance to dirt collection on their emitting surface, deliver a high percentage of their rated output in the worst situations. These lamps, first used in clusters until larger wattages became available, have sparked a succession of advances.

Mercury lamps, long a favorite with industry for their economy of light production, and their good performance in high mountings, entered a new phase of usefulness a few years ago when a new type was introduced with the reflector bulbs. Then, still more recently, a further design improvement has provided a mercury source which does not need to be paired with a filament lamp for good color rendition. The RC1 lamp, with its internal coating of phosphors, in the reflector type bulb, offers something like fluorescent quality illumination. All the rugged economy features are retained. Then, with the upward light the lamp provides, there is a strong inducement to industry to take advantage of it. To do this, reasonably clean ceiling surfaces are required. Where this is provided heavy industry can enjoy an indirect component to soften and diffuse the light on the work. Quality becomes important.

In a typical installation, the RC1

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*From a representative group of 25 good industrial lighting installations we have chosen twelve which demonstrate good choices for a variety of industrial applications. There is today such a range of choice plant engineers can select the one that satisfies particular circumstances most fully.*

*A look at the twelve installation examples which follow offers a good review of choices, made for solving the general lighting need for representative industrial jobs. One of these may be helpful to your own problems.*

*Please note that estimates hourly cost figure given with most of these installation examples is based on double shift operation, 1c kw-hr rate, 35 per cent lamp discount, nominal maintenance, and amortizing cost of buying and installing original equipment over a 10 year period. Better than nominal maintenance would increase the estimate and, of course, the amount of light delivered.*

lamp in deep bowl open fixtures offers a crane assembly plant's workers good quality illumination virtually free from direct glare. The white ceiling that reflects the upward light to the work speaks for cleaner operating conditions. "The human use of human beings", which principle seeks healthful, cheerful working conditions, is advanced where such systems as the one described above can operate effectively.

Heavy industry, striving for methods to reduce dirt and noise, is finding ways to make lighting maintenance more frequent than nominal, and thereby to give greater support to worker safety and skills. At the same time, light industry is undertaking more complete maintenance programs to give greater relevance to its use of much higher levels of illumination.

Maintenance in all phases of industrial operations has become a must as plants become more completely mechanized. The interdependence of all departments of the well-integrated

**Structural Assembly**

This installation represents a trend towards the use of the fluorescent equipment at medium or higher mountings. In this 80-ft by 500-ft room with 55-ft ceiling, the two-lamp 96-in. T12 units are suspended 18 in. from the ceiling. With 25 per cent upward light provided, the ceiling in each bay contributes to the general overall character of the illumination. There are 9 units per row, and the system provides an average 35 footcandles.

*Estimated Hourly Cost—Data insufficient to give cost figures*

**Machine Shop Model Laboratory**

Engineers and craftsmen work together in this shop to produce model thermostats. Layout and fine machine work are critical seeing tasks. A 135-footcandle lighting level is provided to meet these visual requirements. Four-lamp 8-ft fixtures on 8-ft centers direct 50 per cent of their light upward onto a high reflectance ceiling. The walls are painted a light color and bamboo blinds maintain an even brightness at the window wall. The men working in this area experience less fatigue and eyestrain under this new lighting.

*Estimated Hourly Cost—1¢ a footcandle for each 10,000 sq ft.*

**Heavy Industry—H400 R1 Mercury Reflector Lamps**

Because the assembly of large cranes involves relatively large size objects the lighting level of 30 footcandles delivered by the H400 R1 mercury reflector lamps provides a satisfactory lighting job.

Lamps are mounted on 20-ft centers, 32 ft from the floor. In evaluating the system, the low cost of light and reduced maintenance of an R1 mercury system are important considerations. As would be expected for reflector lamps, the lighting level is not affected greatly by dust.

*Estimated Hourly Cost—8/10¢ a footcandle for each 10,000 sq ft.*

plant requires regular attention to all facilities.

Lighting, which is a pre-condition to virtually all operations, contributes most efficiently to the protection of machines and processes when it is regularly maintained at a planned level. The growth of lighting maintenance companies, marked in the last few years, should be faster in the future. Their service, at regular intervals is sometimes more satisfactory than when lighting maintenance is undertaken with plant personnel.

A recent lamp development, the fluorescent Power Groove type, anticipates the coming demand for higher level, good quality systems. Making available twice the light output per length of lamp, half as many units can deliver the same amount of light as other fluorescent lamps. This provides a valuable resource for industry's rapidly increasing demand for more light without larger maintenance costs.

Seven years ago, when I wrote an article under the same title as this

**Loading Platform—Fluorescent Lamps**

Fluorescent lighting on this truck loading dock permits efficient handling of material at night and during any emergency. The job is accomplished by airport apron type, 2-lamp fluorescent luminaries and provides a lighting level of 15 footcandles. The units are positioned beneath the dock canopy at 11 ft 4 in. above the platform and spaced on 14-ft centers. This system was designed to provide efficient seeing inside the trucks as well as on the dock itself. There is a minimum of glare and shadows.

*Estimated Hourly Cost—1-3/10¢ a footcandle for each 10,000 sq ft.*

**Loading Platform—RC1 Lamps**

Because the old 400-watt mercury system provided only 4 footcandles, loading dock workers found it extremely difficult and hazardous to see in and around cars. The new 400-watt color improved mercury reflector lamp ended complaints about lighting. The entire loading dock area was relighted to a 16-footcandle level using the same number of lamps as before. The lamps are on 20-ft by 20-ft centers, mounted at 25 ft. With the new RC1 lamps, the cost of light is lower, maintenance is easier, and the system provides greater comfort through color improvement at no extra cost.

*Estimated Hourly Cost—1-1/10¢ a footcandle for each 10,000 sq ft.*

**Assembly and Finishing Area**

Before relighting, this plant did not have enough light for quick or comfortable seeing. Reflected glare from shiny metal parts and tools was also a serious problem. As shown, a highly comfortable fluorescent system was installed, utilizing 40-watt low brightness lamps, and directing about 40 per cent of the light upward. These 2-lamps units, when mounted in continuous rows on 12-ft centers, provide an even 50-footcandle lighting level. With new lighting, glare and shadows have been eliminated: there is less fatigue and more comfort. Consequently the plant has fewer rejects and production has been increased by 10 per cent.

*Estimated Hourly Cost—1¢ a footcandle for each 10,000 sq ft.*

one for PLANT ENGINEERING, postwar shortages still limited the variety of solutions available. At that time we concentrated on "Six Systems for Industry", with three for heavy operations, and three for lighter production. The combination mercury-filament and the very high bay 3000-watt mercury systems for heavy industry are still good. As we have noted, several alternatives have developed important and new choices in this field.

The three systems suggested in 1950 for lighter industry, where regular maintenance was assumed, consisted of fluorescent equipment arranged in (1) broken rows (2) continuous rows and (3) grids or continuous rows the length and width of the space. The grid system at 80 footcandles is not far from the values sought today in many manufacturing processes. All of these systems, however, would be upgraded by the availability of a number of new more efficient fluorescent sources. The 8-ft T12 lamp, for instance, is a very popular choice for

**Shoe Manufacturing Plant**

In this shoe plant the first relighting job was done just after World War II. It was found inadequate because the high illumination levels used by the distributor in displaying the product revealed slight imperfections not apparent in the plant. The illumination level was about 20 footcandles.

The more recent installation consists of continuous rows of fixtures on 7- to 10-ft spacings. These 2-lamp units contain 96T12 lamps and provide an upward component of light to the high reflectance ceiling area. They are mounted at 8 ft 10 in. with ceiling height of 12 ft. The illumination level here is 80 footcandles, using 2¾ watts per sq ft.

*Estimated Hourly Cost—9/10¢ a footcandle for each 10,000 sq ft.*

**Machine Shop—Filament Lamps**

Here highly skilled craftsmen work to close tolerances. A 50-footcandle lighting level, evenly distributed throughout the working area, is provided by 750-watt R-52 reflector filament lamps on 10-ft by 12-ft centers at 15-ft mounting heights. Workers can see accurately and comfortably. Compared with a system of ordinary incandescent lamps of equal wattage, the reflector lamp system delivers more light to the work initially and throughout lamp life. In this area, lighting is helping to keep rejects low and production high. This company suggests that good lighting is required to obtain the degree of accuracy their product requires and to process their operations efficiently.

*Estimated Hourly Cost—1-2/10¢ a footcandle for each 10,000 sq ft.*

**Fine Assembly**

Bench assembly of delicate electrical equipment has exacting visual requirements. To provide efficient comfortable seeing, a lighting system, with well-shielded fixtures supplying 450 footcandles, was installed. This installation uses a combination of suspended and ceiling-mounted 4-lamp, 8-ft fixtures. The ceiling mounted fixtures house 8-ft slimline lamps in continuous rows on 15-ft centers to provide 60 footcandles. Eight-foot, high-output rapid start lamps are employed in the suspended fixtures which provide 35 deg lamp shielding by means of louvers. Fixtures are 7 ft above the floor in continuous rows placed over front of each bench.

*Estimated Hourly Cost—8/10¢ a footcandle for each 10,000 sq ft.*

industrial fluorescent systems today, for its economy. For even larger economy now there is the high output rapid start lamp. (see Structural Assembly installation) and the Power Groove lamp which was mentioned above.

Supplementary lighting, of course, goes substantially beyond the highest levels sought for general systems. Many specialized tasks in industry have an order of delicacy in seeing akin to the surgeon's. Many fine inspection jobs call for 1000 footcandles.

And a very widely used industrial craft like welding needs 2000 footcandles on the task. Not so long ago welders worked in semi-dark rooms. It was believed that dark environment absorbed more of the ultraviolet radiation of the welding arc, and also that this condition aided the welder's task of following the arc. Today, with white, ultraviolet-absorbing surfaces on either side of the welding seam or spot, and 2000 footcandles to compensate for the brightness of the arc, the task is easier, more accurate.

**Woodworking and Machine Shop Area**

Manufacturing at this plant involves the lamination of steel or aluminum panels to plywood. The panels must have no scratches, glue deposits, or handling marks. To detect such blemishes, quality lighting is mandatory.

The problem was solved by use of 2-lamp 8-ft fixtures mounted 16½ ft from the floor, and connected by cord and plug to an electrical lighting wireway. The fixtures are run in continuous rows on 16-ft centers for basic layout. Where greater intensity is required, single 8-ft units are installed perpendicular to the continuous rows on 14-ft centers. All units provide 30-deg by 30-deg shielding. The lighting level in the manufacturing area is 45 footcandles. The system is also flexible.

*Estimated Hourly Cost—1-2/10¢ a footcandle for each 10,000 sq ft.*

**Metal Fabricating—Mercury Lamps**

Comfort and low maintenance costs were the requirements of the lighting system in this medium-high mounting area. H 400 RC-1 mercury lamps were installed in open bowl fixtures. Thirty-five degree shielding of the lamp bulb is obtained with 18 per cent upward light. These features plus the white ceilings combine to provide a lighting system which has a visual comfort rivaling that of fluorescent. The maintained lighting level is 35 footcandles. Fixtures are spaced on 20-ft centers and mounted 28 ft above the floor. Maintenance costs are low because dirt collection on the sides of these reflector-type lamps has less effect on light output than it has on standard filament or mercury lamps.

*Estimated Hourly Cost—9/10¢ a footcandle for each 10,000 sq ft.*

**Machine Shop—Fluorescent Lamps**

This company decided to do a relighting job when a survey showed that employees were squinting at their work. This picture contrasts the old and the new lighting. Under the old system shown in the foreground, single fluorescent lamps in closed top units are located 3 ft above each work bench. The new system shown in the far room directs 25 per cent of the generated light toward the ceiling and provides light colored walls and ceiling to reflect the light. This technique effectively reduces brightness contrasts. The installation uses continuous rows of 8-ft slimline lamps on 7-ft centers mounted 10 ft from the floor and maintains a lighting level of 80 footcandles.

*Estimated Hourly Cost—8/10¢ a footcandle for each 10,000 sq ft.*

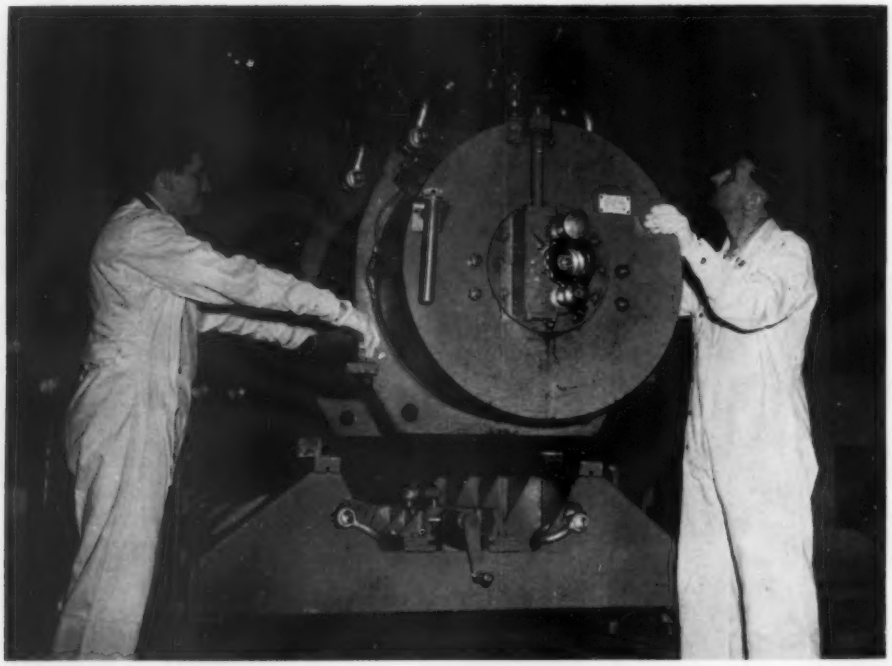

Fig. 1. Active uranium rods are being transferred from a magazine to a concrete storage block

# Safe Handling of Radioactive Materials

## Personnel Handles the "Hot Stuff" With Special Equipment

By W. S. EASTWOOD, Deputy Head of Isotope Division,
Atomic Energy Research Establishment, Harwell, England

Fig. 2. Operator examines an active uranium sample through this periscope

HANDLING METHODS employed in an atomic energy program are different from methods used in industrial processes because of the radioactive or toxic hazards associated with some of the materials. The radiations are of three types, each having a different degree of penetration, some being more easily shielded than others.

These radiations are not difficult to detect by geiger counter, photographic film or other methods, but their insidious danger to living bodies is that they give no physical sensation. Only at a later stage does the harm to blood cells or tissues become apparent. However, our knowledge of the measurement and protection against these dangers is extensive.

Let us examine some of the methods used in handling radioactive material from the uranium ore onwards.

Uranium, the atomic fuel, is found in a variety of ores in various places but the commonest is pitchblende-uraninite which usually occurs in hard rock either very disseminated or in small veins. The $U_3O_8$ content is only 0.3 per cent. The hazards at this stage are two: the flying uranium dust, which may be inhaled, and also the radon gas, a decomposition product from the radium content. In each case the alpha radiation becomes fixed in the body and may lead to chronic internal destruction of lung cells and other organs.

The danger is avoided if the dust is laid; and fortunately in this type of mine the ore is naturally wet. In subsequent processes no special precautions are taken, but in crushing or transfer between conveyor belts where dust may be generated, extractor hoods and detection monitors should be used. The operators may also be given face masks.

Transport of ore as concentrate or chemical precipitate must be in powder-tight packing, and welded steel drums or kegs with a good gasket seal should be used. Radiations from uranium and its ores are not of the penetrating type. Almost nothing penetrates the steel containers.

The processes of extracting the metal

**Fig. 3. Active samples are transferred from containers, right foreground, to dispatch boxes. Operator at left is measuring the surface radiation dose rate**

and purifying it call for no special problems of handling. The stages involve treatment with acid, hydrogen peroxide and purification by an ether solvent extraction stage.

In our plant the ball mills which grind the ore are run wet so that there is little chance of the toxic uranium dust developing. Suitable ventilation is provided and a high standard of cleanliness is maintained. Workers must observe a strict washing routine and wear special clothes.

The metal is heavy and hard and of silvery appearance when new-cut. An oxide film soon forms to give the surface a black color. Machining processes on uranium follow normal lines but there is another hazard besides that of the dust.

Finely divided metal is pyrophoric, and chips or swarf from the machines both can and do become red hot or take fire. All cutting should be done with a liberal supply of lubricant. Tapping the metal is difficult and should be avoided if possible. Although the radioactivity is slight and of such a weak nature that it barely penetrates the skin of the hand, gloves are usually worn to avoid contamination. The metal can be stored and moved about by normal methods.

This is not true of plutonium, which is very radioactive and toxic. Both plutonium and the enriched 235 uranium isotope are fissionable and will react violently if more than a critical weight is assembled together.

Depending on the type of reactor and whether the uranium is the natural metal or enriched in the fissionable 235 isotope, the uranium may be replaced in a pile at intervals from a week to several years. The shapes of uranium fuel rods vary, too. Present reactors use rods or flat bars; future designs may use continuously pumped solutions or slurries.

Upon withdrawal from a reactor, the uranium also contains a mixture of highly radioactive fission products—elements on the average of half the atomic weight of the uranium. Some elements decay in activity quite rapidly but others persist for many years, and the radiation is penetrating in character.

The fuel element is drawn out of the reactor by remote control into a lead-walled flask having a protective thickness of a foot of lead to stop the gamma radiation. Some reactors use a gas as the heat-exchange medium or are flushed with helium to avoid explosions of hydrogen and oxygen of decomposed heavy water.

In this case, attachment of the flask must break a gas seal and yet remain gas tight while withdrawing the spent fuel rod. Initially the radioactive energy in the fresh fission products generates considerable heat, and uranium may require forced cooling or immersion in water for a day or two.

Since the portable flasks are heavy, weighing 15 to 20 tons, lifting cranes are a necessary part of a reactor installation. Fuel elements are transferred to a storage shield consisting of a massive concrete block with vertical holes for the elements. In other cases

**Fig. 4. This 20-ton lead-filled flask is being used to withdraw the uranium fuel elements from the heavy water reactor**

**Fig. 5. These men are able to handle isotopes behind lead-wall cells with the help of viewing mirrors and special tools**

Fig. 6. Man separates combustible from non-combustible waste

Fig. 7. Incinerator takes care of some radioactive waste

they may be dropped into a pond under 13 to 16 ft of water where their high gamma radiation may be used for various processes.

After six months or a year the activity has fallen from 20 to 30 per cent of its original value, although it is still not safe to approach without protection. The fuel is then taken in protective lead or concrete cylinders to the chemical processing plant. There, the uranium is dissolved, the fission products separated, and the valuable fissionable plutonium extracted.

The production of radioisotopes reduced to its simplest terms involves putting small cans of materials into a reactor and later taking them out.

This operation has been improved by use of an endless belt made up of small hinged blocks of graphite. Cans for irradiation are placed in the blocks and the belt is moved from the face of the reactor into a suitable position in the middle.

After withdrawal from the reactor the samples and even their aluminum cans are radioactive. All subsequent handling and manipulation has to be done behind suitable protective screening or at a distance. Sometimes the sample is packed immediately for dispatch to the user in a box containing a lead pot which encloses the sample. In other cases, chemical operations are required to make special compounds.

Chemical and mechanical operations upon radioactive materials have created a new technology of remote handling. Virtually any operation may be called for but with the difference that one cannot approach the source of activity without protective screening nor can one use one's hands or fingers.

For the radiations of small penetration and dusty substances, dry boxes are used consisting of hermetically sealed enclosures having a plastic front. The operations are performed through sealed portholes and the box is kept at a pressure below the outside air to prevent leakage outwards.

For more penetrating radiations, lead or concrete cells enclose the active material. In the concrete type, which may have walls 5 ft thick, viewing is done through a clear liquid window of zinc bromide solution let into the cell front. This liquid is of the same density as the concrete and gives equivalent protection.

Elaborately designed manipulators having metal fingers within the cell are controlled by the operator from outside. Thus, the user can transmit various rotary and translatory motions to pick up and move the contents of the cell. Lead wall cells are sometimes one foot thick, and these use manipulating tools passing through tungsten or uranium spheres set in the wall, making a universal joint. Viewing is done either by mirrors or through blocks of glass having a high lead content.

The design of laboratories for radioactive work depends on the activities used and the form of the substance. Adequate fume hoods, cells and dry boxes are needed, and after this, avoidance of contamination is the chief aim. Floors, benches and walls must not be absorptive, and the surfaces must be able to be washed clean. Special clothing and rubber gloves can be used to protect the operators when necessary.

Disposal of small quantities of active effluent can be made into normal drains. Larger quantities may pass into delay tanks to allow decay and dilution of activity before disposal at sea.

Within an atomic establishment, active objects can be moved around in containers, usually of lead, weighing anything from about a ton to several tons. At present the chief traffic outside the power plant is in radioisotopes which are sent all over the world.

Containers usually comprise a lead pot enclosed in a larger box. In this way both the heavy lead and the distance of the package surfaces from the source inside contribute to the reduction of radiation intensity.

# X. Air Cylinder Maintenance

## Cylinder Types, Why They Fail, What To Do About It

By H. L. STEWART and J. M. MORITZ, Logansport Machine Co., Inc.

CONTROLLED, powered motion is the desired end product of any industrial pneumatic system. Two devices are employed to accomplish this motion—air cylinders for lineal motion and air motors for rotary motion. For industrial use we can divide air cylinders into five classifications: extra-light-duty or "throw-away" cylinder; the light-duty cylinder; medium-duty cylinder; heavy-duty cylinder; and the heavy-duty, mill-type cylinder.

Let us examine each classification. The extra-light-duty or "throw-away type" cylinders usually operate at a very low pressure—5 to 25 or 30 psi and are used to perform operations that require extreme speeds. These cylinders are of a very small bore, ½ in. to 1½ in. diameter, with strokes from ⅛ in. to 1 in. They are compact and inexpensive. Seldom do they cost more than a couple of dollars. Their design is such that when they need repairs, it's less expensive to dispose of them and buy new ones.

Light-duty air cylinders are used in quantities for operating clamps, small fixtures, light-duty indexing fixtures, etc. These cylinders are normally of a small bore and short stroke, and operate up to 90 psi. The cylinder bodies and covers are often die cast which helps reduce their cost. Cylinders of this type are usually designed so they can be repaired. A minimum of mounting styles is offered.

For the past twenty-five years the medium-duty air cylinder has been pretty much the standard of the pneumatic industry. Recognized by its cast iron covers, brass cylinder tube, and tie rod construction, the medium-duty cylinder was designed to meet the bulk of applications for pushing, pulling, lifting, tilting, forcing and similar jobs. They utilize air pressures up to 125 psi. The mounting of these cylinders covers a wide range—rabbeted, foot, blind-end flange, rod-end flange, center line, trunnion, and clevis. Cylinder bores range from 1½ to 16 in. in diameter and strokes from ⅛ in. up to 18 and 20 ft. Several types of packings are used on pistons, but the cup packing type prevails. Rod packing also varies in design, but the Vee type is one of the more prominent.

Cylinders in this category can be furnished with or without cushions. Such cushioning devices are of two types—the adjustable and non-adjustable. The purpose of these cushions is to alleviate the shock as the piston makes contact with the covers. Cushions are not to be construed as speed control devices. Length of effective cushions is usually somewhat less than 1 in. on standard cylinders. Some special cylinders have been built with cushions as long as 6 and 8 in. These are used mostly where there is a requirement in which a heavy load

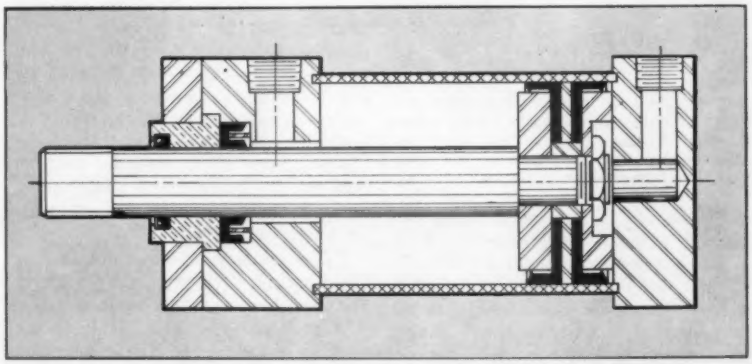

**Fig. 1. Heavy-duty air cylinders are similar to medium-duty cylinders but are more rugged for the rough usage they get because of industry's high production demands**

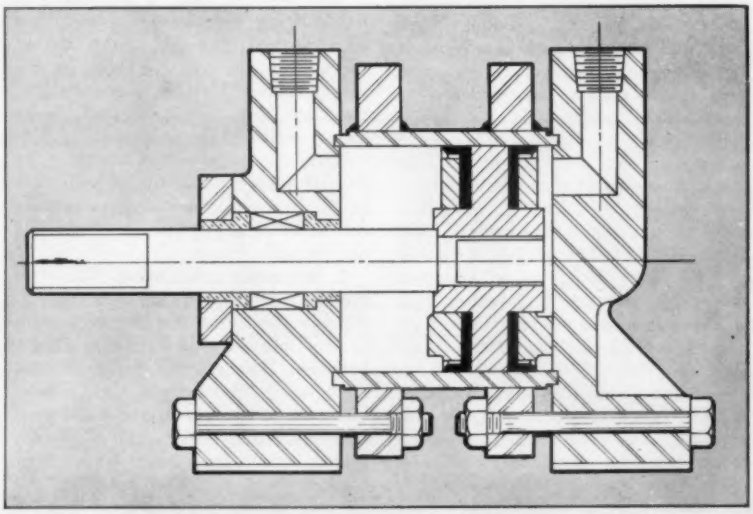

**Fig. 2. This is a heavy-duty, mill-type cylinder, rugged construction of which is designed to withstand shock loads such as those encountered in steel mills**

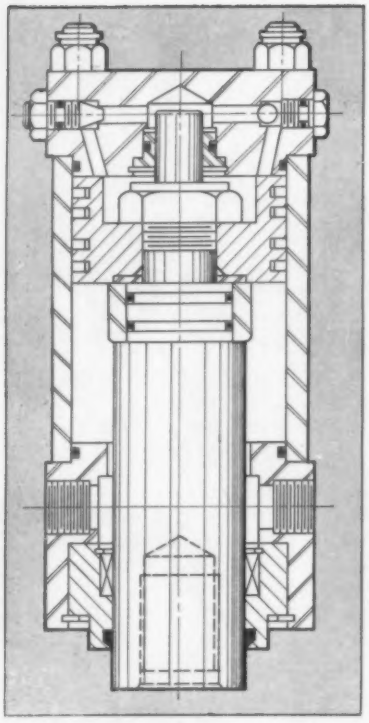

**Fig. 3. One of the several different types of cushion designs is shown here. Closing of the large orifice must be effected by the fit between the two surfaces, the cushion nose and bearing**

travelling at high speed must be stopped without any shock.

The heavy-duty air cylinder, Fig. 1, is quite like the medium-duty cylinder except that it is considerably more rugged. Due to extreme rough usage encountered in this age of high production, heavy-duty cylinders have plate steel covers, steel pistons, and heavy-duty tie rods. Some use a cartridge type seal, sealing the piston rod, while others use "hat" packing, block Vees, and Chevron packings. Most of the heavy-duty cylinders are designed with square covers and hardened or chrome-plated piston rods.

Heavy-duty cylinders are available either with or without cushions. Size range is comparable to the medium-duty cylinder. Choices of mounting styles exceed those of the medium-duty cylinders. Tie rod mountings for either end or both ends, cover trunnion mountings, and side and bottom foot mounting are also offered. These cylinders may be used for 150 psi air service or 500 psi oil service.

The heavy-duty, mill-type cylinder is really in a class of its own. Built to withstand the very rugged operation in a steel mill or similar metal processing plant, its design differs considerably from that of other types of air cylinders. While there are some standard lines of mill-type cylinders available, many are built to meet customer's requirements.

The heavy-duty, mill-type cylinder, shown in Fig. 2, is recognized by its welded steel tube construction, extremely heavy plate or cast steel covers, heavy-duty piston rod, and extra heavy piston. Note the large air passages which allow for the rapid entrance and exit of large volumes of air. Use of bolts rather than screws to hold the cover to the cylinder tube makes for easier maintenance.

These cylinders are designed for higher air pressures, up to 250 psi, and can be furnished with or without cushioning devices. Cylinders with trunnions have their trunnions welded to the cylinder tube. These trunnions are extremely rugged as they often must take some exceptional high shock loads.

Adjustable type packings are usually used in these cylinders. In many instances the cylinders must withstand high temperatures and their packings are made accordingly.

Air cylinders may be either single or double acting, i.e. the single acting has power on the piston in one direction and the piston is either returned by gravity or spring pressure; the double acting has air power on the piston in both directions. While the first four classifications of cylinders are made in both the single and double acting types, very few mill-type cylinders are made for single action.

Cylinders may be either rotating or non-rotating. All five classifications are available in the non-rotating types. The rotating type is available in the medium duty range. These cylinders are used on lathes, grinders, and other machines in which the cylinder must rotate with the machine spindle.

One word of caution in regard to non-rotating cylinders—it should not be construed that the piston rod of these cylinders will not turn as the piston moves. If it is necessary that they not turn, some external device should be used to stop rotation.

Maintenance personnel should make regular inspection of the air cylinders in their plant. Much compressed air can be saved if cylinders are regularly maintained.

**1. Improper lubrication.** This does not always mean insufficient lubrication, it may mean the use of an improper lubricant. In the case of insufficient lubrication, there is not enough oil deposited on the cylinder walls or on the piston rod by the air line lubricating means to allow the piston, which may have synthetic or leather seals, to move freely in the cylinder tube or the piston rod to move freely through the rod packing.

Friction causes heat and rapid wear. It is not uncommon to disassemble a cylinder which has had no lubrication and find that the packing and seals are in a charred condition or that tiny particles have flaked off and are lying in the bottom of the cylinder.

Insufficient lubrication can usually be detected by the sluggish action or jerky motion of the piston. It also can be detected by checking the air as it exhausts from the four way valve that is connected to the cylinder. If the exhaust is completely free of oil, you can pretty well judge that there is no lubrication present in the cylinder. The result of this condition is not only loss of power, uneven movement of piston, and rapid wear on seals and packings, but it also causes wear on other internal parts such as the interior of cylinder tube, cushions, and piston rod.

Wrong types of lubricant can also cause plenty of trouble to an air cylinder. The material of seals and packings should be known and a lubricant should be selected that will have no effect on them. For example, it has been found that cylinders having packings and seals of synthetic material function well with a grade A spindle oil as a lubricant.

### Use Proper Lubricant

Improper lubricant may cause the packings and seals to swell to such a point that they will freeze the piston and rod. Some lubricants cause the packings to deteriorate until they will not hold air pressure. In cylinders using certain types of impregnated leather packings the lubricant may wash out the impregnating material and cause leakage.

To determine if the lubricant is causing cylinder failure, it is necessary to disassemble the cylinder and inspect the seals and packings. If this be the cause, the cylinder should be completely disassembled, all parts thoroughly washed in a cleaner, properly dried, and all packings, seals and gaskets replaced. Close inspection should be made of the piston rod and cylinder tube to determine whether the lubricant could cause a reaction that would cause pits in either of these items.

**2. Using the wrong cylinder for the job.** At the beginning of this article we mentioned that cylinders could fall into one of five classifications. So often cylinder failure can be attributed to improper selection of a cylinder. A good maintenance man can quickly recognize when a cylinder of one classification failed because it did not have the qualifications to perform the job.

For example, a medium-duty cylinder with cast iron covers and piston may be placed on a roll over device in a steel mill. This cylinder may have

ample power to perform the job, but the tremendous shock load created by the large coils of sheet steel as they are being moved over this device will cause failure in the cast iron parts. Here is where a heavy-duty, mill-type cylinder is required.

An improper selection of cylinder mounting types often causes trouble. A rigid type mounting such as foot, center line, or flange is often selected where the selection should have been a flexible type such as the clevis or trunnion. Result: feet and mounting lugs are broken on the cylinder covers, piston rods are bent, pistons broken, rod bearings and cylinder tubes are scored, and packing leaks are created.

And, sometimes, non-cushioned cylinders are selected where cushioned cylinders should have been used. While this does not usually have too much effect on the cylinder, except on cylinders with cast iron covers, it does have considerable effect upon mounting bolts, machine structures, and often on the workpiece. As an example, if a tray full of fragile pieces being moved by an air cylinder is suddenly stopped, the whole tray full may be dumped or broken; whereas, proper cushioning will bring the tray to a halt without a harmful jar.

**3. Dirt within the cylinder will often cause it to fail.** Pipe scale or shavings from pipe thread, welding beads and other foreign matter from a poorly installed system is a source of failure. The damage is to the piston packing, the cylinder tube and the piston. This condition is certainly inexcusable.

**4. Heat from external sources.** Such heat often causes failure within the cylinder as it will cause the piston seals and rod packing to deteriorate. As mentioned in the article on installation, the cylinders should be protected from heat. Where this is impossible, use high temperature packings.

**5. Misalignment often causes cylinder failure.** If not only causes breakage of mounting lugs, but causes excessive rod packing and bearing wear. These results also happen when the piston rods on long stroke cylinders are not supported at the end, or when the piston rods are subjected to eccentric loading.

## Air Cylinder Cushion Failure

When a cushion fails to function properly it can cause considerable trouble in the action of the device of which the cylinder is a part. Cushion failure can be easily detected because the speed of the piston does not reduce as it approaches the covers. Cushions are of no value if the piston does not traverse its full stroke.

There are several cushion designs

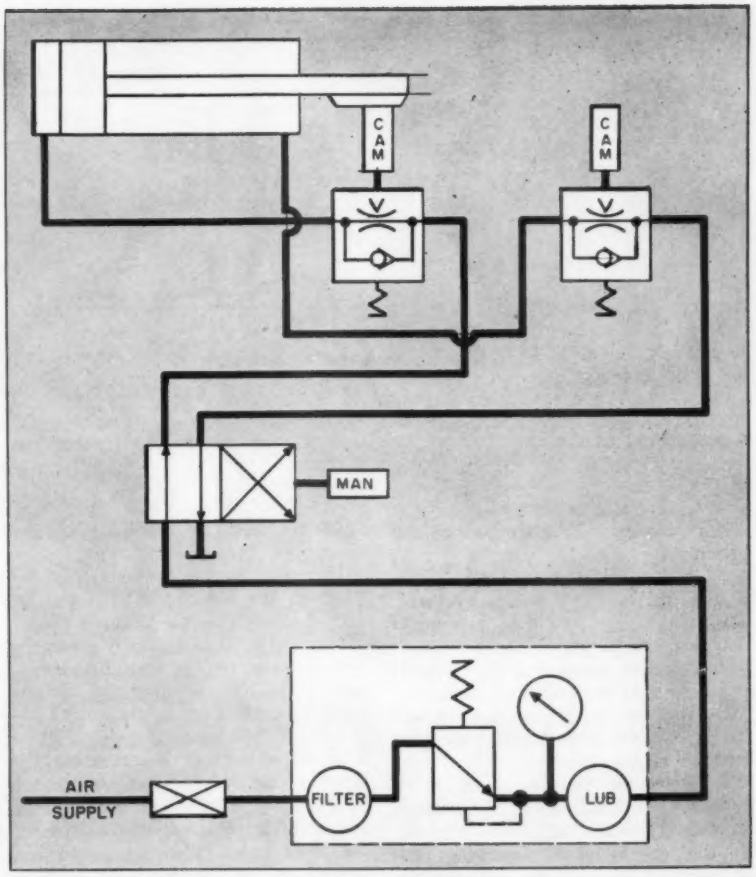


**Fig. 4. Cam-operated flow-control valves can be added to circuits to eliminate need for built-in cushions. This method requires extra piping and extra space**

now in use, one of the more common is shown in Fig. 3. In this one, the closing of the large orifice must be effected by the fit between two metal surfaces, the cushion nose and the cushion bearing. A synthetic seal is often used to seal the cushion nose.

Cause of cushion failure may be attributed to leakage which could result from one of several factors:

1. Too much clearance in the all metal cushion between the cushion nose and the cushion bushing or bearing. For good cushioning, there should be about 0.002 clearance. Too much clearance is caused by wear or improper fitting.

2. Scored cushion collars or scored

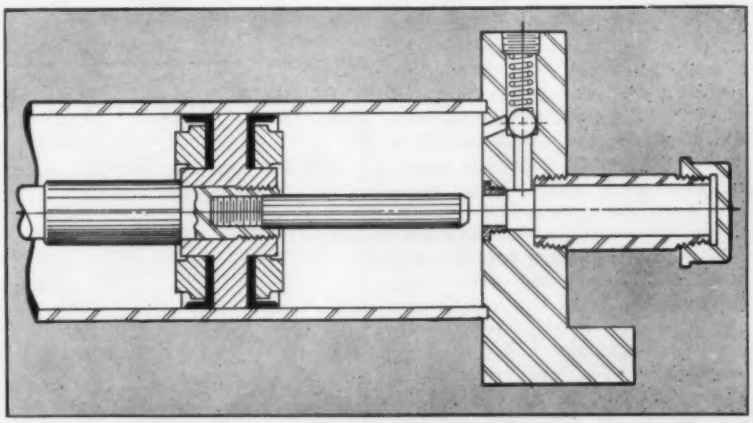

**Fig. 5. This is one method of lengthening cushioning at blind end of cylinder. This drawing shows a simple capped pipe added to the back end of the cover**

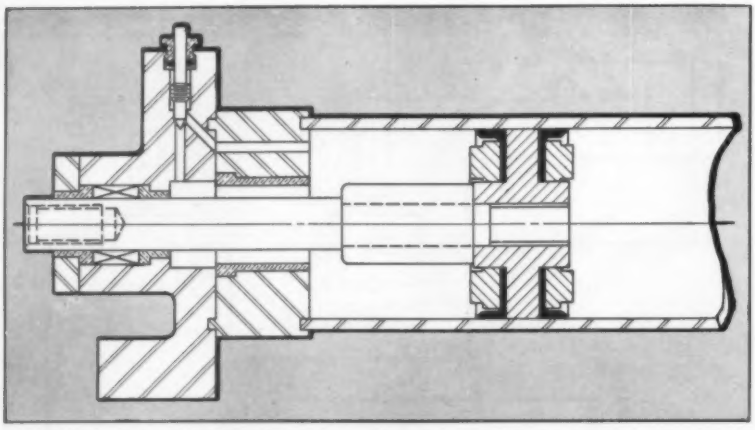

**Fig. 6. One method of increasing the cushion length at the rod end of the cylinder means adding an extension on back of the front cover, adding longer piston rod**

cushion bushing which may be the result of dirt or misalignment of the piston rod.

3. Damaged cushion seals. This occurs in cushions using synthetic seals. Seals may be cut by pipe scale or other foreign matter.

4. Defective piston seals which make it appear that the cushion is defective. However, the trapped air is by-passed back past the piston seals and the cushion is not affected.

5. Defective cushion check valve assembly which will not allow the check to seal off when the air is trapped. If the check is not working, inspect the check seat, the ball, and the check valve spring. A defect in any one of these will cause trouble. To increase the effect of the cushion, close down the size of the cushion needle orifice by turning cushion needle to the right.

If the cushion is too short for the application, there are a couple of things that can be done to correct this condition.

1. Eliminate the use of the built-in cushions and add a cam operated flow control valve as shown in circuit in Fig. 4. By using this method, any length cushion that is desired can be selected. The only drawback to this method is it is necessary to connect a cam on the piston rod or machine table which sometimes is not feasible. This method also requires some extra piping and some extra space.

2. If cushioning on the blind end of the cylinder only needs to be lengthened, this does not create too much of a problem. The back end of the blind cover can be bored out and tapped, and a length of pipe with a cap can be added as shown in Fig. 5. A longer cushion nose can then be added to the piston rod by removing the old nose and adding the longer one and fitting it to the cushion backing. By this method it is not necessary to make any change in the mounting dimensions.

However, if the cushioning is too short on the rod end of the cylinder and it is not possible to make use of a cam valve, then you are presented with quite a problem. It will be necessary to change the mounting dimensions to conform with the length required for the extra cushioning. Figure 6 shows a method of increasing the length of the cushion dimension on the rod end of the cylinder. Note that an extension is required on the back of the front cover, a longer piston rod needed as well as a longer cushion collar, and longer tie rods. You can see that considerable expense is involved in making this change.

Methods using electric shut-off valves, electric eyes, etc. can be worked out to effect a long cushion but this is rather an expensive proposition and takes up considerable space.

A question often arises as to the best method of determining an internal leak in an air cylinder. Often the user thinks that he has a leaky cylinder when actually the valve is leaking, sometimes the reverse is true. A simple method for determining whether the compressed air is leaking past the piston is to shift the four way valve so that air is directed to the blind end of the cylinder and force the piston to the end of the stroke, then break the airline at the rod end of the cylinder and check for leakage. Next, connect the airline at the rod, shift the four way valve directing air to the rod end and move the piston to the blind end. Then break the connection at the blind end and check for leakage. To check for leakage at the center of the piston travel use the same procedure except block the piston so that it will only travel to the center position.

1. Clean rust from piston rods with a fine emery cloth. Do not use a file.

2. If piston rods are pitted deeply, better scrap them. If you don't, your bill for rod packing will be excessive.

3. If you crack a cast iron cover, you will probably be able to braze it for temporary service, but you had better get a new one on order.

4. If the cylinder tube shows any deep scores, it should be replaced. Shallow scores can be polished out and the tube saved. Deep scores, if honed out, will probably make the tube oversize to such an extent that the packings will not seal.

5. When replacing rod packing or piston seals, be extra cautious so as not to cut any of the sealing surfaces. A slight radius or chamfer on the end of the piston rod makes it easier to shove the packings over the rod. Use of a lubricant also helps.

6. When assembling cylinders, be sure to pull up evenly on the tie rods or cover bolts. When assembling cylinders with mounting feet, make certain that the feet on both your covers are in line. Make assembly on a flat plate.

7. Remember, an air cylinder is a precision piece of equipment, and it should be treated accordingly. Give it proper care and your efforts will be well rewarded.


## Plant Engineering Is Moving to New Quarters

BY THE TIME you read this issue, we will have, we hope, moved into our spanking new building in Barrington, Illinois.

We would like to remind our readers that correspondence should be addressed as follows:

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The next time you are in the Chicago area, why not drop out and see us. We'd like to show you around.

**CAN BE INSTALLED ANYWHERE.** Here workers begin to feed RoZone-RoSeal cable into conduit inside underground vault of St. John's Hospital. This versatile cable can be used anywhere—in the air, in conduit and ducts, direct in earth, even in water.

**EASY TO PULL.** Workers at the new St. John's Hospital in Tulsa draw Rome's easy-pulling high-voltage cable from underground switch vault to surface and power transformers. The hospital's architect recognized *all* the advantages of RoZone-RoSeal (see his letter below).

# Profit from this architect's experience with Rome's premium high-voltage cable

LEON B. SENTER, A.I.A.
ARCHITECT
308-7 PHILTOWER BLDG.
TULSA, OKLAHOMA

November 28, 1955

Regarding our choice of RoZone-RoSeal cable for St. John's Hospital:

We can tell you that due to the nature of the building, extreme reliability was the first consideration.

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We found that a specification built around Rome Cable's RoZone-RoSeal satisfied all the above.

Very truly yours,

LEON B. SENTER, A.I.A.

John C. Penafeather

John C. Penafeather
Mechanical Engineer

JCP:lz

He wanted the same things you probably want in a high-voltage cable: reliability, moisture resistance, the right electrical characteristics, and uniformity. He found them all in Rome Cable's RoZone-RoSeal.

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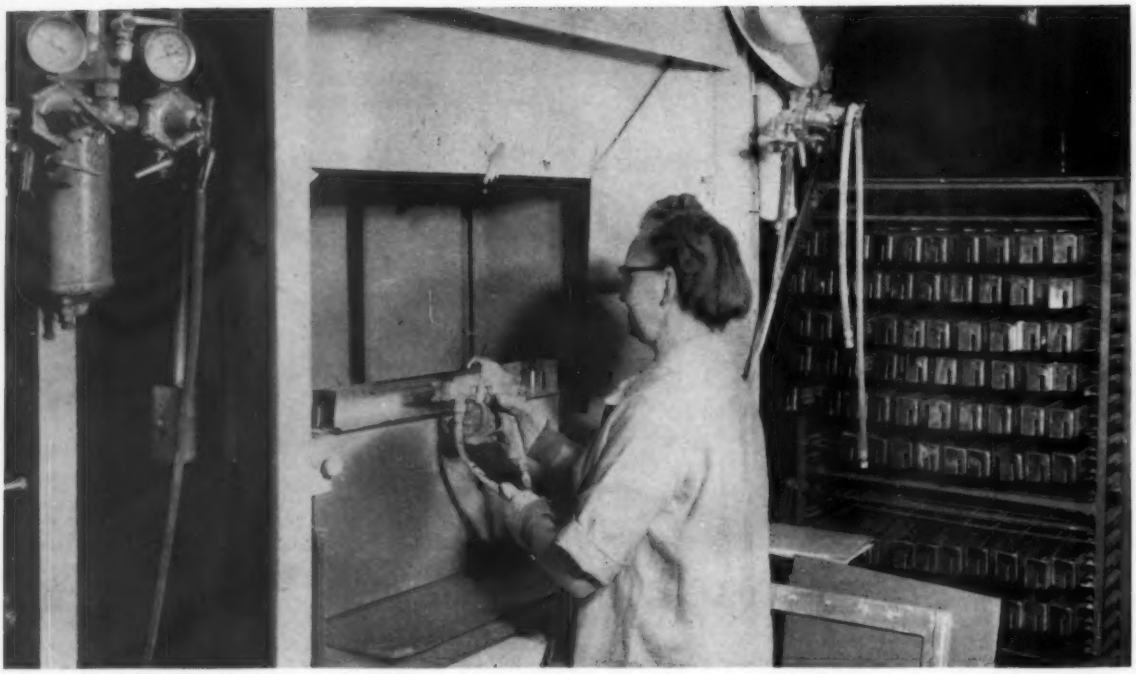

Fig. 1. Hand spray guns are used with standard floor-type spray booths for applying single coat of air dried lacquer

# Spray Painting Plastic Pieces

## Redesigned System Cuts Costs at American Motors

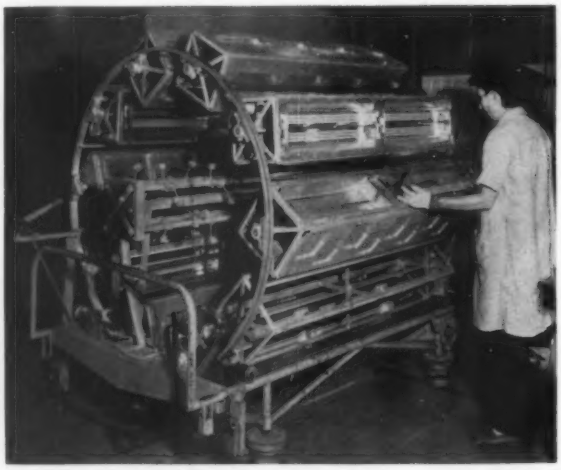

Fig. 2. Plastic pieces seen being painted in Fig. 1, are first given aluminum finish in vacuum metallizing machine

SPRAY PAINTING system, geared to the special production problems encountered in the finishing of decorative and functional plastic pieces used in automobiles and refrigerators, has produced savings in costs and time at the American Motors plastics plant in Milwaukee, Wis. The system was developed by engineers at American Motors and the Binks Manufacturing Co., Chicago, Ill.

An increase in volume of decorative work on the molded plastic components from four to 45 per cent in the eight years since the plant was put into operation, posed new production problems which have been met by the redesign of the plant's spray painting facilities.

One of the first steps in accomplishing this was the installation of a paint mixing and circulating system to handle distribution of the flat and metallescent paints used in spray finishing the plastic pieces. Another major change initiated was the installation of three double face, dry type spray booths. Each side of each booth is equipped with two automatic spray guns operated by foot treadles. These booths are used for the finishing of

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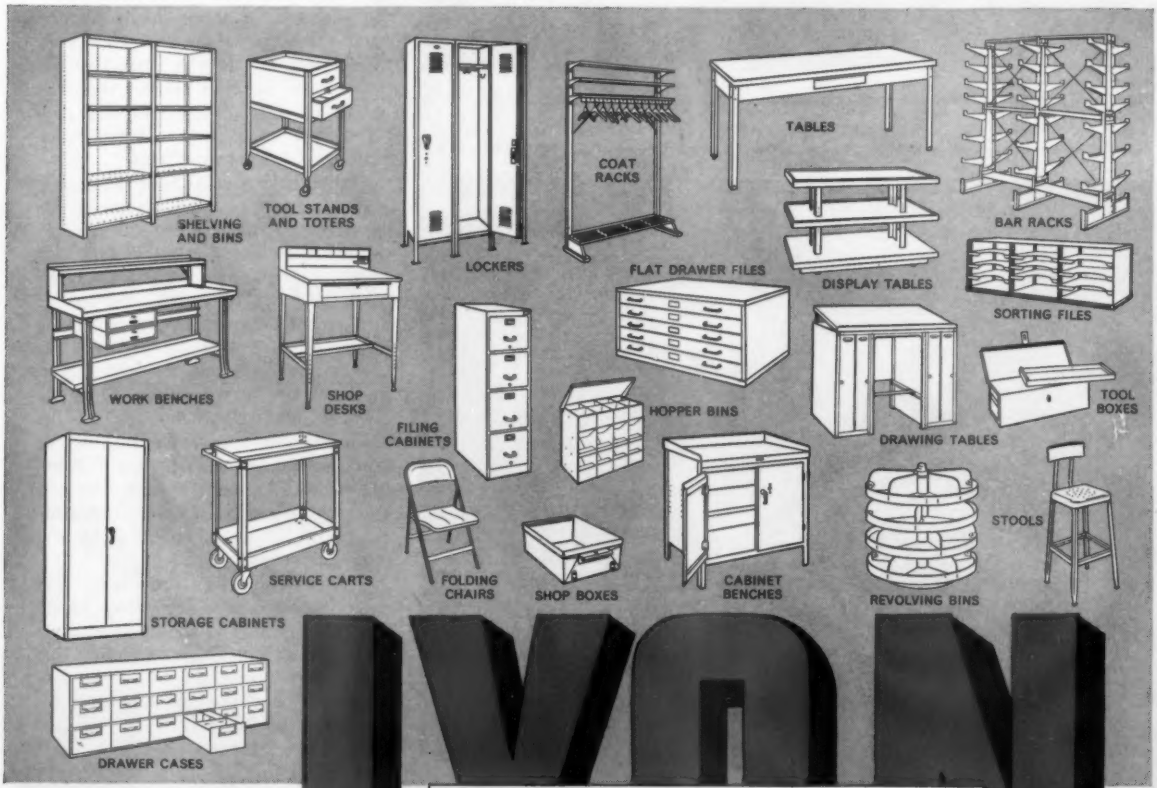


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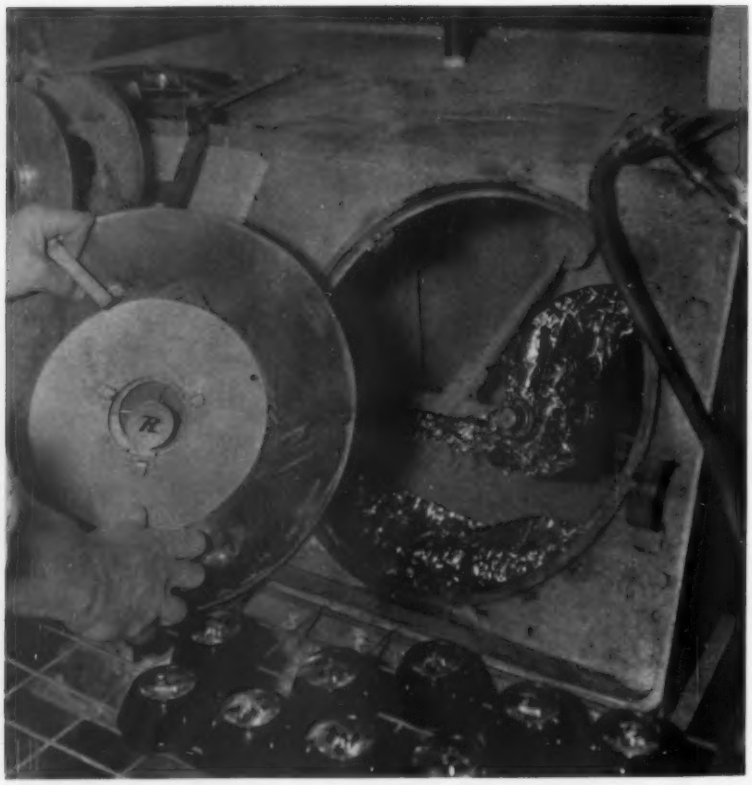
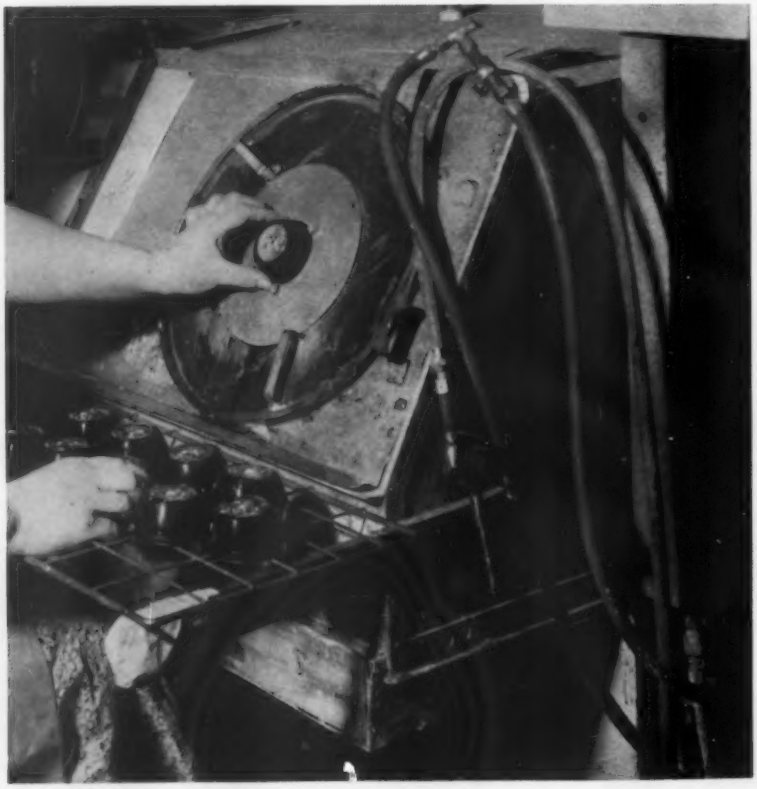


Fig. 3. Mask and fitting for horn button, left, and automatic spray inside booth

Fig. 4. Horn button in position for spraying. Spray is operated by foot treadle



plastic interior automotive trim parts.

Production of the plastic pieces involves use of injection molding of pieces to proper size and shape. They vary in weight from four to 200 oz. The largest piece produced is an inner door liner for refrigerators. Other pieces include refrigerator shelves, humidifier doors, refrigerator trim and automotive parts.

After the plastic pieces used in the refrigeration line have been molded, they are moved to double face standard dry type booths for back up painting. In these booths, guns are used to hand spray a protective coating of air dried lacquer to the back of the pieces. This coating provides a necessary backing and protects their vacuum-metallized, silvery aluminum surface.

The spray finishing operation uses reciprocating pumps to keep paint circulating, with back pressure controlled by modulating valves. Special paint agitation and circulating units were designed for the system by American Motors engineers.

The system employs eight different pipes, each carrying paint of a different color to a total of 40 spray painting stations. Of these, 28 are in the hand spraying booths and 12 are in the automatic booths. Among the items hand sprayed in the standard booths are refrigerator shelves, inside refrigerator door pieces, refrigerator buttons and decorative trim.

The three double face automatic spray booths are used primarily for spraying the horn buttons for automobiles with metallescent paint. Each booth contains four automatic spray guns that oscillate rapidly. A special mask is fitted over the openings of the booths and over each spray gun by the operator, who then fits the horn button in the center of the mask. When the operator presses the foot treadle, the automatic gun sprays the area of the horn button exposed inside the booth in seconds. The spray booths filter and eject all overspray to the outside atmosphere, keeping shop air clean and free of paint particles.

The mask and its holder, which fits over the booth, were devised by American Motors. All of the paint stations on the American Motors finishing line are equipped with oil and water extractors that remove impurities from the air used for atomization of the paint. The extractors work with pressure regulators to help control the pressure at which atomization occurs.

Prior to the installation of the automatic booths, the horn buttons were hand sprayed in the mask frame. The new method has resulted in estimated 40 to 50 per cent reductions in cost and time consumed by work operation.

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TRADEMARK

**For more facts circle 563 on Reply Card**

Instructor I. M. McNair, electrical engineer, conducts class on principles and practices of electricity. He and other instructors find visual aids, such as instruments, samples of equipment and drawings, useful in demonstrating principals

# Operation Bootstrap—

## An After Hours Study Plan for Plant Engineers

By A. H. GIPSON, Engineering Department Chief, Western Electric Co., Inc., Allentown, Pa.

ENGINEERS who stop studying stop being engineers. Such a statement should be good for an argument at any engineers' lunch table, and so it was at Western Electric's Allentown Works.

The unusual twist, however, was that the plant's structural engineer led the conversation around to methods of continuing study while working and finally offered to conduct a few evenings review sessions on structures. Somewhat to his surprise, his offer was immediately accepted by most of those present, and by the end of the day, 18 people had said they would like to attend.

This produced a "what, when and where" problem. So, one evening after work a meeting was called to determine what could be done. The methods used in the courses that resulted from this meeting are presented here with the thought that they may be of interest to other groups.

The organization meeting disclosed that the subject "Structures" found many of the group in need of brushing up, and they were enthusiastic about participating. The engineer who had offered to teach the class knew quite a bit about the subject and, in addition, had several years' teaching experience. Also, a classroom with adequate blackboard and writing facilities was available.

After some discussion of details, the most troublesome of which proved to be selecting a suitable evening, it was decided to start classes the following Monday. It was agreed that 90-minute sessions would be reasonable for class periods and would not conflict with home activities.

At the first class meeting, the instructor outlined what he would teach. He pointed out that he would present his theory and problems from college texts, but that he expected the class to procure only a notebook and a structures handbook. The latter was to be used for class work and would be useful for reference after the completion of the course.

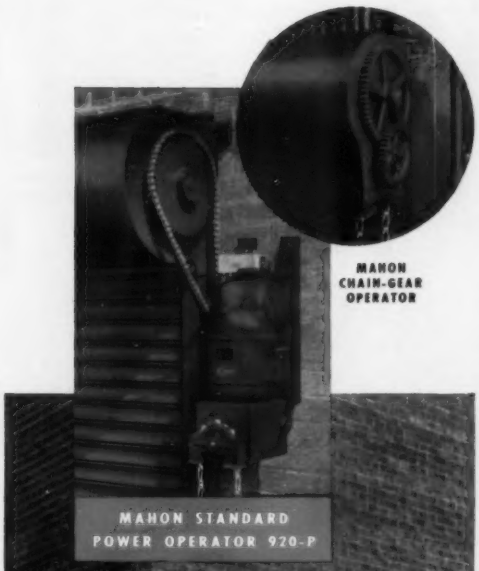
As to classroom procedure, the group spent the first half of the period on theory, took a five-minute break and then worked on problems for the remainder of the time. During this problem period, a few examples were worked on the blackboard, then additional problems were worked on paper so that questions could be asked on any points that proved troublesome.

At the conclusion of each class meeting, homework was given. This usually consisted of a problem that would take about an hour to solve. Among the topics reviewed were beams and columns of wood and steel, concrete footings, bearing plates and fastenings and the loading of floors and beams.

During the twenty weeks that this course was conducted, it caused a great deal of comment among other groups in the plant. The fact that interest could be maintained among people of widely varied education and

# Rolling Steel Doors

*Manually, Mechanically or Electrically Operated*




**The selection of the right type of door for an opening is an important decision. This is particularly true in loading dock openings, truck openings and railroad openings where the time element and operating space requirements are primary considerations. This is where the rolling steel door comes into its own . . . because, a quick-opening, quick-closing, power operated rolling steel door saves both time and space. The vertical roll-up action is fast, requires no usable space either inside or outside the opening, and there are no overhead tracks or other obstructions to restrict headroom and interfere with handling or goods stacking adjacent to the opening. No other type of door can give you this compactness in operation. And no other type of door can give you the positive security, firesafety and permanence of a good rolling steel door . . . all-metal construction reduces maintenance to a negligible factor, and assures you a lifetime of continuous trouble-free service. When you buy a rolling steel door, it will pay you to check specifications carefully . . . you'll find that Mahon doors are built better to give you better service over a longer period of time—for instance, the galvanized steel in Mahon curtain slats is BONDERIZED and DIP-COATED with Synthetic Enamel which is baked on at 350° F. prior to roll-forming. This is just one of the extra-value features of Mahon Rolling Steel Doors . . . comparison will disclose many others that add up to a much better investment. See Sweet's Files for information, or write for Catalogue G-57.**

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Manufacturers of Rolling Steel Doors, Grilles, and Automatic Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Underwriters' Rated Fire Walls; Insulated Metal Curtain Walls; Electrified M-Floors; Acoustical and Troffer Forms; and Steel Roof Decks and Long Span M-Decks.

ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Above are Two of Three Mahon Power Operated Rolling Steel Doors installed in double truck openings in a new plant for Nicolay-Dancey, Inc., Detroit, Michigan. In this installation, Doors are mounted outside while Power Operators are mounted inside with Mahon Thru-the-Wall Drive. Harold D. Ilgenfritz, Architect. F. H. Martin Company, General Contractors.

# MAHON

**For more facts circle 564 on Reply Card**

experience, and that the subject was presented in such a way as to be useful both at home and at work, produced many requests for a repetition of the course the following year.

After those who had attended the structures class talked it over, however, it was decided to try another subject instead of repeating. The new subject selected was: "A Review of Electricity —Principles and Practice." Again, a competent instructor was found.

In order to prevent an overflow of the available classroom facilities and to provide a class of reasonably uniform background, applications were limited to people in the engineering group and those whose work involved electrical applications.

For this course no text was found that exactly satisfied the requirements, so again handbooks and notebooks were used and it was recommended that each member of the class procure a copy of the National Electrical Code. For these sessions, the instructor had prints made of typical problems and circuits, and these, added to class notes, provided an excellent handbook.

The class started with a quick review of the basic principles of electricity, then went on to a more detailed study of electrical equipment and electrical testing and measuring devices, and finally worked on design problems involving circuits and wiring. During the entire course, demonstrations, samples and practical examples were used.

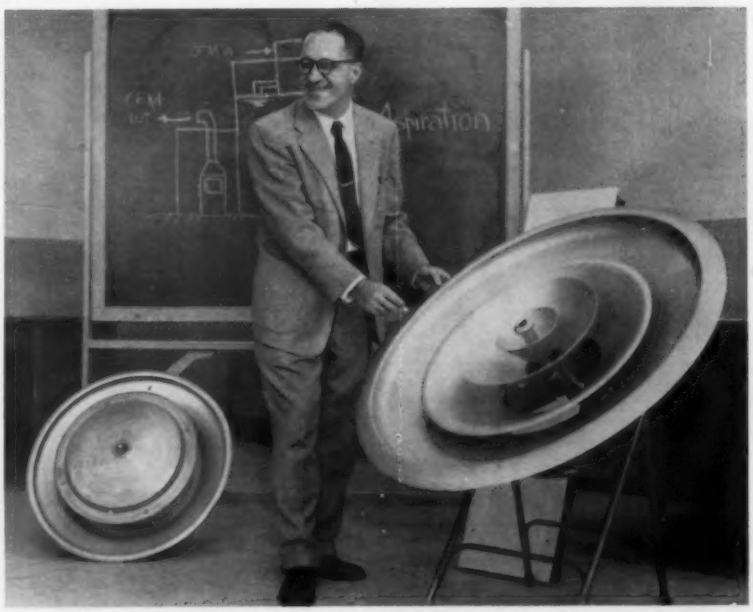
Wherever applicable, manufacturers literature was distributed, and the instructor was careful to include both domestic and industrial problems. However, generation, transmission and distribution problems of the type peculiar to power companies were avoided as being of little practical interest to this group, except where they demonstrated a point or were of an unusual nature.

This general outline gave the instructor the opportunity of including discussions of design, construction, maintenance, safety and economics. The object of these lessons was to provide a review of electricity for those who worked with it, but an interesting and unexpected advantage developed in permitting the indoctrination of some members whose work was not primarily electrical.

After the course on electricity it was assumed by the class that another series would be given the following year and the suggestion was made and accepted that the subject be "Air Conditioning." Experience from previous courses indicated that approximately 25 applications would be received. However, the unusually hot summer seemed to focus attention on the plants' air conditioning, and 47 applications were received. As an experiment, the classes were moved to a larger room so that all could be accepted for the 10-week course. It is interesting to note that all 42 who enrolled, completed the course.

Throughout this course, basic air conditioning principles were stressed and simply explained so that, at the end, the material presented made it possible for several students to design and install successful air conditioning units in their own homes.

Because of the scope of this course and the number of students, it was decided to share the teaching load by assigning lecture topics to various class members. As a result, it was found that "experts" can be made "by appointment."



**Instructor A. M. Hanfmann combines theory and practice in teaching the air conditioning course. After explaining the theory, he discusses the actual equipment**

From the courses given thus far, a few principles have evolved:

1. People will faithfully attend classes and do a reasonable amount of homework.

2. Once a group is started, interest tends to build up and the group continues and grows.

3. Ten weeks is an optimum course period to give sufficient time for development of a topic without requiring a longer commitment than many adults will make. Courses that would normally exceed ten weeks can be divided and those that would run a shorter time can be combined.

4. Selecting an evening is one of the more difficult problems. In a reasonably large group any evening will meet with objections. The procedure now used is to select one that suits the instructor and avoids large scale interferences, such as shopping night, and then announce the course and evening at the same time.

5. Useful samples, demonstrations and literature are available from manufacturers and, if not overdone, can add to the effectiveness of the class.

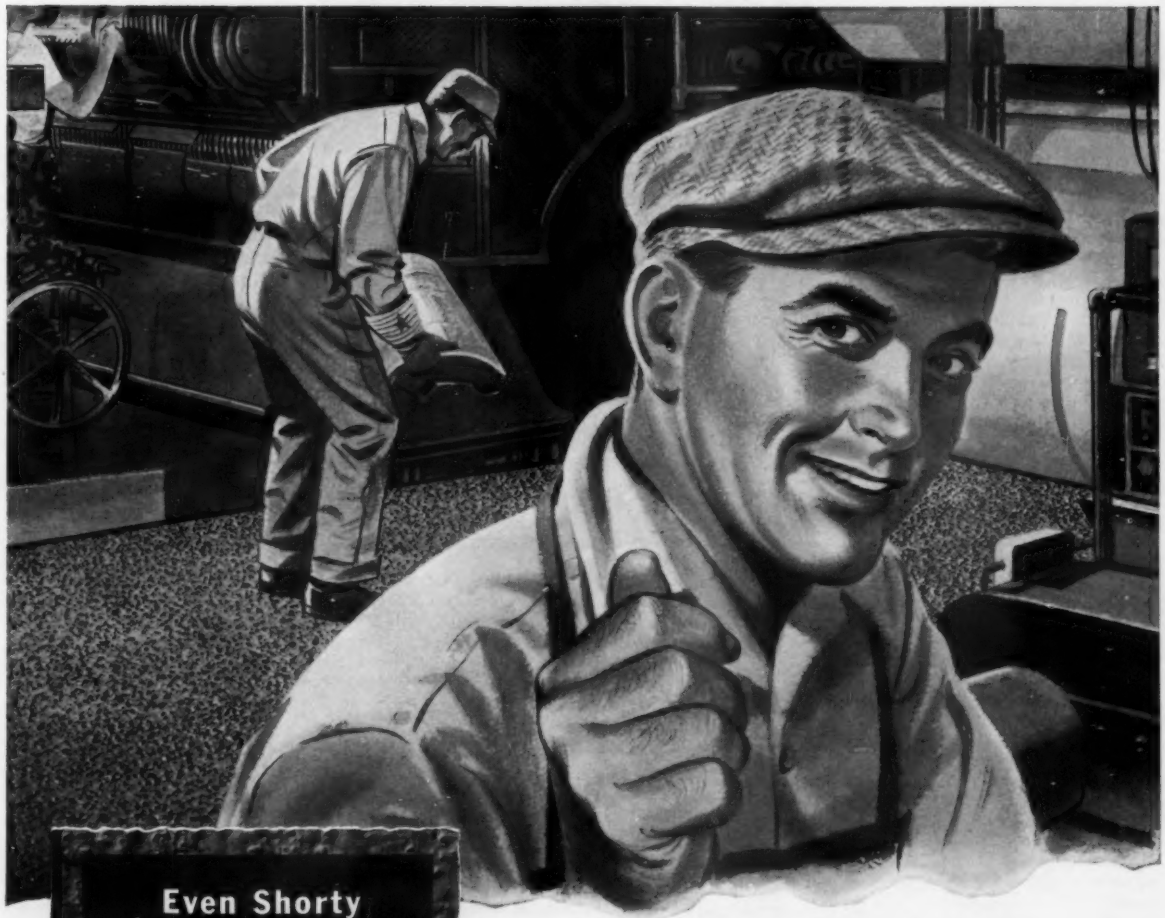
6. Home problems and plant problems can and should be combined to maintain interest and enhance the usefulness of the classes.

7. The scope of each class should be carefully detailed in the announcement. This will avoid the disrupting effect on the class and the disappointment to individuals when people drop out because they do not get what they expected.

8. A nominal registration fee discourages the merely curious and also provides a small fund for the instructor's inevitable expenses.

9. Great care must be taken to prevent embarrassment. To this end no marks are given, open correction of class problems is avoided and teaching technique is "discussion" rather than "question and answer."

These principles could be called "Do's." There is really only one important "Don't." Don't wait for an ideal situation—it will never occur. In any group there is a need and every group can find or make an instructor, but not every group will start. As in so many other activities, the most important thing is to establish a deadline and get started.



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"This new stuff" is the world's only abrasive rolled steel floor plate—A.W. ALGRIP—a super-safe footing under the *most hazardous* slipping conditions—including those caused by ink mist and oil.

"Even Shorty doesn't slip" sums up the ALGRIP safety story. ALGRIP's exceptional non-slip properties result from a patented process in which a grinding-wheel type abrasive is rolled—*not coated*—to a controlled depth as an *integral* part of tough steel plate. Usage merely exposes more abrasive.

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ALGRIP—*approved for safety by Underwriters' Laboratories*

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OTHER PRODUCTS:
A.W. SUPER-DIAMOND rolled steel floor plate—Plates—Hot and cold rolled sheet and strip—(Alloy and Special Grades)

**For more facts circle 565 on Reply Card**

# NEW PLANT CONSTRUCTION — advance information on location, costs

**Los Angeles, Calif.**—Jerseymaid Milk Products Co., 1040 W. Slauson Ave., plans to expand and modernize company's facilities here for the production of milk and milk products. In addition to remodeling the existing plant, the company will build a two-story addition to include a new cold storage room, a new milk processing room and additional administration facilities. Completion of the program by early 1958 will represent a cost in excess of $500,000.

**Riverside, Calif.**—Lily-Tulip Cup Corp., 380 Lexington Ave., New York, N. Y., plans to construct a 325,000-sq ft plant for the manufacture of paper cups and nested food containers. The multi-million dollar plant will be in full operation by mid-1958 with a small operation planned to be under way the latter part of this year.

**Pensacola, Fla.** — Heyden Newport Chemical Co., subsidiary of Heyden Chemical Corp., 342 Madison Ave., New York, N. Y., plans to construct a new research laboratory for the development of special chemicals for the synthetic rubber industry. Work is scheduled for completion by the first quarter of 1958.

**Brunswick, Ga.**—Allied Chemical & Dye Corp., Semet-Solvay Division, has announced plans for the expansion of production facilities here. Plant capacity will be doubled. Work is already under way and is scheduled for completion by early 1958. Company plans to spend approximately $10 million on the expansion program.

**Georgetown, Idaho**—Central Farmers Fertilizer Co., 608 S. Dearborn St., Chicago, Ill., has announced that work will start at once on its projected phosphate mine and processing plant near here. Contracts have already been let for the $13.5 million facility which is scheduled to be in operation by late 1958.

**Henry, Ill.**—B. F. Goodrich Chemical Co., 2069 E. 9th St., Cleveland, O., plans to construct a new plant for the production of organic chemicals for the petroleum, rubber and plastic industries. Construction is now under way and is scheduled for completion by the spring of 1958. Blaw-Knox, Pittsburgh, Pa., has been awarded the construction contract which will involve an expenditure of $5 million.

**Frankfort, Ind.** — Peter Paul, Inc., candy manufacturers, plans to construct a new plant. New facility, 148,000 sq ft, is scheduled for completion by summer of 1958, and will represent an investment of approximately $1.5 million.

**Lawrence, Kan.**—Callery Chemical Co., Callery, Pa., jointly owned by Mine Safety Appliances Co. and Gulf Oil Corp., plans to construct a new plant for the production of boron chemicals for commercial use. New facility will consist of 11 buildings and four chemical processing areas. Each processing unit will be situated on a one-acre site and will be capable of doubling its capacity within that area. Plant reported to cost between $3 and $4 million.

**Potwin, Kan.**—Vickers Petroleum Co., 8506 E. Central St., Wichita, Kan., is constructing a new petro-chemical plant near here. Company will produce toluene, benzene, xylene and other carbonatom aromatics. Procon Inc., Des Plaines, Ill., is the construction contractor. Cost of facility is reported to be $2 million.

**Carrollton, Ky.**—Metal & Thermit Corp., 102 E. 42nd St., New York, N. Y., plans to construct a new chemical processing plant. New facility will produce organic chemicals for the plastics, textile, pharmaceutical and other industries. Plant will be completed by early 1958 and is reported to cost about $3 million.

**Braithwaite, La.** — Freeport Sulphur Co., 161 E. 42nd St., New York, N. Y., plans to construct a new nickel and cobalt refining plant near here, 10 miles southeast of New Orleans. Planned capacity of the Louisiana refinery will be 50 million lb of nickel metal and 4.4 million lb of cobalt metal annually. Plant is expected to be in partial production by the summer of 1959.

**Lowell, Mass.**—Cambridge Corp., a subsidiary of Carrier Corp., Syracuse, N. Y., has announced plans for the constuction of buildings and equipment for expansion of present production capacity. Company is engaged principally in the production of cryogenic equipment for the storage, transport and pumping of liquid gases such as oxygen, nitrogen and argon. Work will begin at once on construction of plant addition and on equipping another plant in Lowell for heavy production and one in Nashua, N. H., for the manufacture of aircraft equipment. Cost of planned expansion reported to be $1.3 million.

**Bay City, Mich.**—Dow Chemical Co., 1000 Main St., Midland, Mich., plans to construct a new petro-chemicals plant on local site here, adjacent to the Bay Refining Corp., which Dow Chemical acquired last summer. Plant will consist of a cracking unit, an ethylene unit and a butadiene unit.

**Detroit, Mich.**—Massey-Harris Co., Racine, Wis., plans major expansion of facilities here. Construction will start at once on doubling size of company's tractor plant. In the processing phase of the assembly operation, each unit will be thoroughly reworked and designed for simultaneous assembly, synchronized with incoming orders for the wide variety of power sizes of new model tractors. Expansion program will be completed by early 1958 and will represent an investment in excess of $4 million.

**Columbus, Miss.** — Hooker Electrochemical Co., 1940 Ward St., Niagara Falls, N. Y., is now in the process of blueprinting a $1-million expansion of company's sodium chlorate facilities at local plant. Installations when completed will boost the company's annual output at this plant from 17,000 to 22,000 tons of sodium chlorate.

**Hillside, N. J.**—Bristol-Myers Co., Products Division, 630 Fifth Ave., New York, N. Y., plans to construct a new warehouse and administration facilities here. Plans call for a three-story building approximately 200 ft wide by 400 ft long. Target date for completion of the addition is scheduled for spring of 1958 at a cost reported just under $1 million.

**Perth Amboy, N. J.**—Anlin Co. of N. J. and the California Oil Co., Barber, N. J., plan to construct a sulphur recovery plant. New plant to be owned and operated by Anlin Co., will be built adjacent to Caloil's Perth Amboy refinery and is expected to be completed by early 1958. Caloil, under a working agreement with Anlin, will supply the plant with refinery fuel gases. The clean sulfur-free gas will then be returned to the Caloil plant for use as a refinery fuel.

**Union Beach, N. J.**—Van Ameringen-Haebler, Inc., 521 West 57th St., New York, N. Y., has announced plans for the installation of 15 new distillation units for the production of aromatic chemicals for the soap and perfume industries as an expansion program here to cost in excess of $1.5 million. Expansion and investment of new equipment is part of a general expansion program which the company is planning for its aromatic chemical and flavor facilities.

**Albuquerque, N. M.**—Ideal Cement Co., Denver National Building, Denver, Colo., plans to construct a new cement plant on local site owned by company. Construction plans call for installation of one rotary kiln equipped with electronic dust control. Cost of the first stage of construction will be $10 to $12 million and completion is scheduled for the early part of 1958.

**Sidney, N. Y.**—Bendix Aviation Corp., Fisher Bldg., Detroit, Mich., has announced a $5-million plant expansion

(Continued on page 206)

# MODERN OIL AND GAS FIRED BOILERS

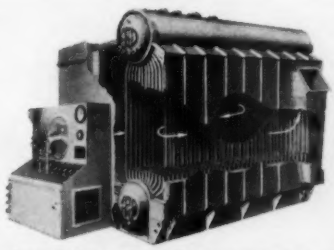
The boilers illustrated here cover the broad capacity range from 4,000 to 600,000 lb of steam per hr. They are all especially designed for gas and/or oil firing. The two units illustrated at right (Types VP and VU-55) are standardized and each is available in several sizes. The capacity range covered by these two units is from 4,000 to 120,000 lb per hr. The two units below are custom designed for various capacity, pressure and temperature requirements up to 600,000 lb per hr, 1400 psi and 950 F. All these units are pressure fired and do not require induced draft fans.

Collectively, they offer an exceptional diversity of choice. A brief consideration of the features of each type will help you "pinpoint" the design characteristics best suited to your particular needs.

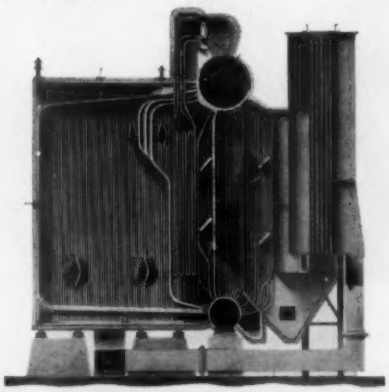
Of course there are other C-E two drum Vertical-Unit Boilers available for pressures up to 1400 psi and temperatures up to 960 F. Shown here are but four popular members of the C-E family of Vertical-Unit Boilers—a family which has achieved a wide measure of acceptance using all types of fuel.

*Please feel free to call on us for further detailed information. Catalogs are available upon request.*

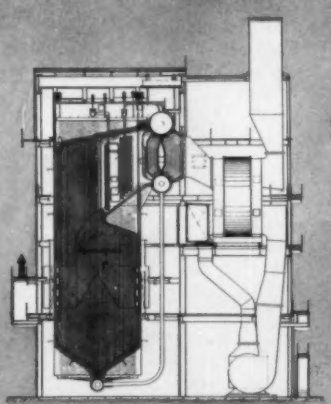
B-922-A



**C-E Package Boiler — Type VP** Completely shop assembled . . . available in fourteen sizes from 4,000 to 40,000 lb capacity . . . pressures to 500 psi. Available with integral console control panel, this unit contains more water-cooled area per cubic foot of furnace volume than any other boiler of its size and type. It can be equipped with any of several approved burners.

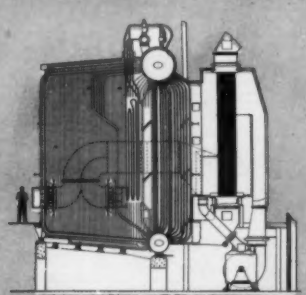


**C-E Vertical Unit Boiler — Type VU-55** Available in six sizes . . . capacities from 50,000 to 120,000 lb steam per hour . . . designed for two pressure ranges, 250 psi and 500 psi, and total steam temperatures up to 750 F. This double cased, gas-tight unit is equipped with tangential burners. A large (60-inch) steam drum assures generous water capacity and steam reservoir space. Tangent tube waterwalls offer complete furnace protection, minimizing maintenance.



**C-E Vertical Unit Boiler — Type V2**

This unit is available for capacities from 200,000 to 600,000 lb per hr. It can be designed for pressures up to 1400 psi and for temperatures to 950 F. Tilting tangential burners, providing superheat control, are standard equipment although horizontal burners are available, if desired. A double, gas-tight casing assures lifetime tightness and minimum heat loss. Heat recovery equipment can be furnished as desired.



**C-E Vertical Unit Boiler — Type VU-50B**

This unit is available for capacities from 50,000 to 400,000 lb per hr—pressures to 1400 psi and temperatures to 950 F. This bottom-supported design uses tilting tangential burners providing effective superheat control. Horizontal burners can be furnished if desired. Heat recovery equipment as required. This unit makes available to industrial installations a standard of performance comparable to utility practice.

## COMBUSTION ENGINEERING

**Combustion Engineering Building**

**200 Madison Avenue, New York 16, N. Y.**

All types of steam generating, fuel burning and related equipment; nuclear reactors; paper mill equipment; pulverizers; flash drying systems; pressure vessels; soil pipe

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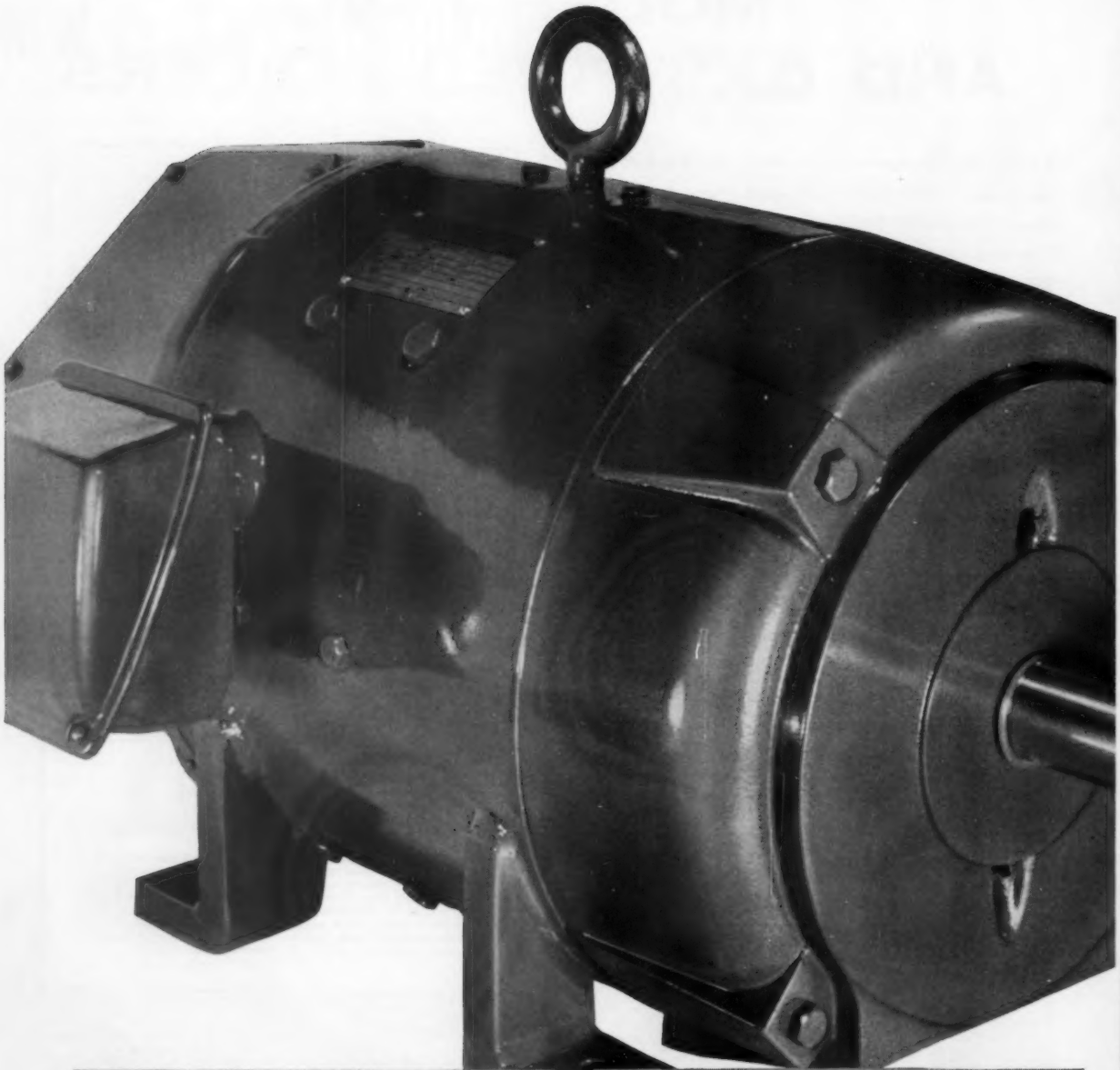
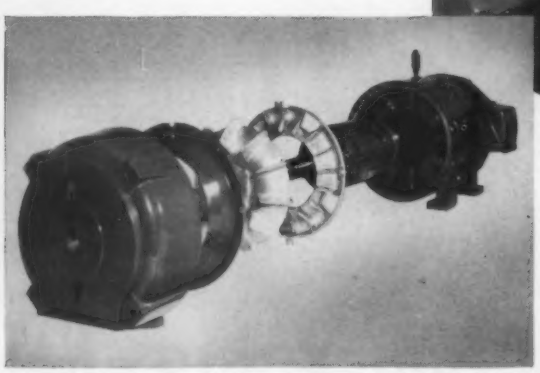
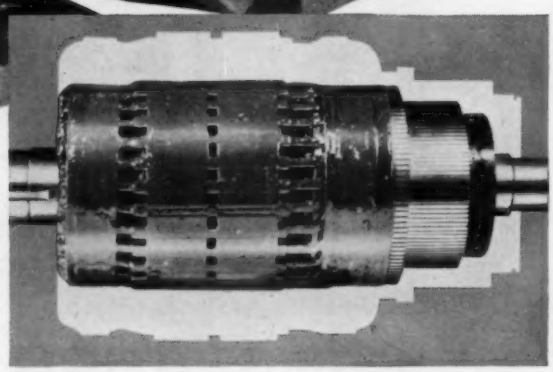




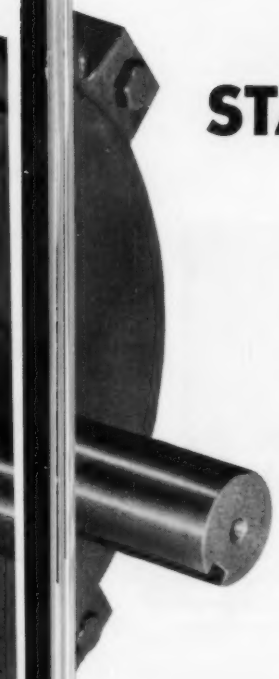
**NEW CONTROLLED VENTILATION**—pushes air through the motor from drive end to commutator end, opposite to the ordinary direction. Armature cooling is increased... harmful brush dust created at the commutator is blown out of the motor.



**NEW LEVEL OF RESPONSE**—Improved ventilation makes up to 55% lower armature inertia possible without sacrifice in capacity. Life-Line "H" gives the fastest accelerations and regulating speed changes for more and better production.

Westinghouse *Life-Line H* with silicone insulation

# FASTEST RESPONSE OF ANY STANDARD INDUSTRIAL MOTOR

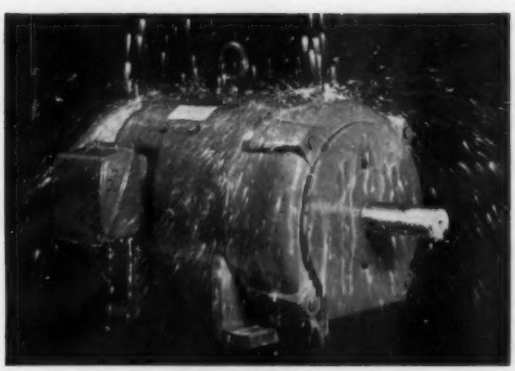


## Life-Line® "H" Backs Up Lowest Inertia With High Commutating Ability for Increased Production

Highly responsive drives are essential to fast automatic processing. No other d-c drive provides as fast speed changes as the Westinghouse Life-Line "H".

Efficient controlled ventilation makes possible the long, slim design of the Life-Line "H" armature, reducing inertia as much as 55% without sacrificing any capacity. 35% increase in commutating ability backs up this lowest inertia to produce the fastest response available in standard industrial d-c motors today.

In addition, the new Life-Line "H" with silicone insulation, offers many dividends in long-term dependability and minimum maintenance. For all the facts about Life-Line "H" call your Westinghouse sales engineer. Or, write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa. Ask for B-7056. J-21991-C



**NEW HOUSING DESIGN**—provides maximum protection—eliminates need for splashproof enclosures in many cases. All access openings are sealed with covers . . . single ventilation opening in each bracket faces directly down.

YOU CAN BE SURE...IF IT'S

Westinghouse

## Electronically-Controlled Air Separation Plant for Liquefied Gases

RECENTLY PLACED in production, Air Reduction Co.'s new air separation plant is producing purified gases for industrial and commercial consumption in the Chicago area. The plant, including related distribution facilities, cost in excess of 7½ million dollars, and is of completely modern design with pushbutton operation from an electronic control panel. It has been designed so that it can be readily expanded.

Daily production will be 55 tons of high purity liquid oxygen, 15 tons of liquid nitrogen and 3½ tons of liquid argon in this, the company's third large air separation plant.

Production of the new plant will be distributed to industrial plants within a 300-mile radius of Chicago. Distribution will be in cylinders, tube trailers, tank trucks and railroad tank cars.

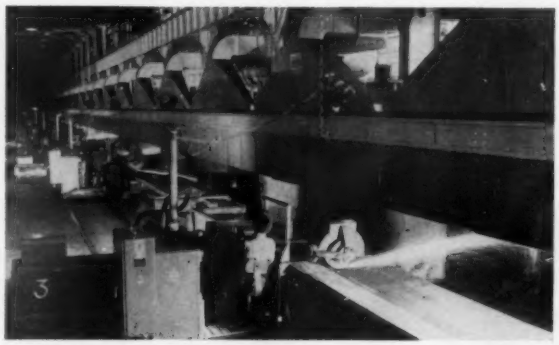
## Swing Grinders Give Way to Hydraulic-Electric Units in Slab Mill

WORKMEN AT Allegheny Ludlum Steel Corp. operate new hydraulic-electric billet grinders, which were recently placed in operation at the Brackenridge plant of this producer of stainless and high alloy steels.

Allegheny Ludlum has installed a line of seven of the machines, which move on rails up and down the length of the steel slab as the electrically-powered grinding wheels remove surface imperfections. Following this, the slab is reheated and rolled into flat stainless steel products. Hydraulic pressure holds the grinding wheel firmly against the slab, as the operator sits and manipulates the power controls. The wheel itself is moveable in any direction across the slab.

Overhead vacuum dust collectors remove sparks and dust from the mechanized grinding line.

The motorized billet grinders are faster and more efficient than older style swing grinders, which are operated by workmen using muscular strength to hold the counterbalanced grinding wheel against the metal. Because of steadier pressure and more effective control made possible by the motorized grinders, surface grinding is more uniform, resulting ultimately in a smoother, more uniform surface on the finished stainless steel sheet.



## Hot Balance Test Pit Goes Into Service To Test Turbine Rotor

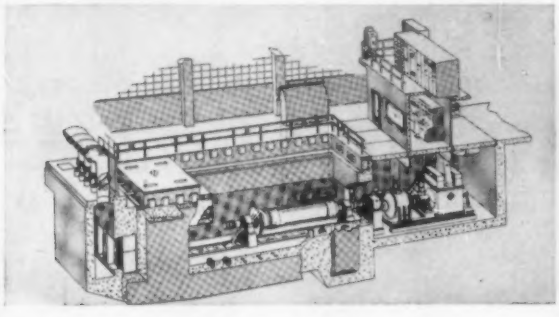
USED FOR PRECISION BALANCING and overspeeding of turbine generator rotors under temperature conditions simulating actual operation, the most modern test pit of its kind in the country has been placed in service at the West Allis Works of Allis-Chalmers Mfg. Co.

Fifty feet long, 11 ft wide and 18 ft deep, the facility is constructed of massive reinforced concrete and steel, and has a 9-ft-thick breechblock cover arrangement with shock-absorbent sections of steel and timber. This high-energy-retention construction also serves as a sound absorber.

A 2500-hp, two-speed motor is used to drive the test rotor, through an eddy current coupling and speed increaser. It is capable of rapid acceleration as well as accurate speed adjustment. Temperature of the rotor is regulated by control of air flow through four ventilating fans.

Remote indicating, testing and precision balancing instrumentation is located in a control room on the main floor overlooking the pit. Complete observation and supervision of the facility is conducted from this room. Quick access to the generator rotor between test runs is afforded by an elevator between the control room and the pit level.

One of the first tests run in the new hot balance test pit, which was constructed in a 34-ft addition to the main assembly shop, was with a 98-ton, 1800-rpm rotor.



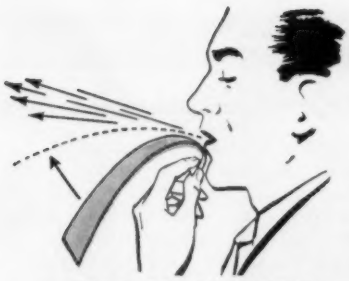
# ALL YOU NEED IS A STRIP OF PAPER!

See for yourself

**how this unique Sarco TD steam trap operates**

...why it's so simple...so trouble-free

...so effective

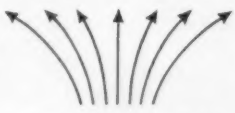


***THE PAPER EXPERIMENT***

Hold a strip of paper (about 1⅜" wide by 7" long) directly under your lower lip. Blow — creating **low-pressure** area above the paper. It will be forced **upward** by atmospheric pressure, rising to horizontal position!

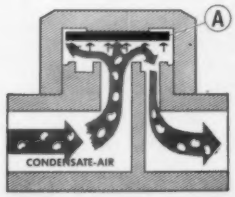
**SO SIMPLE—this is way same principle works in Sarco TD steam trap**

**1.** Substitute a simple Sarco valve disc for the strip of paper.

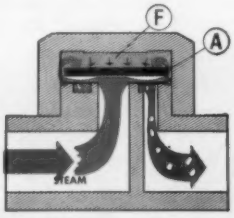


**2.** Substitute a high velocity jet of steam for the jet of air.

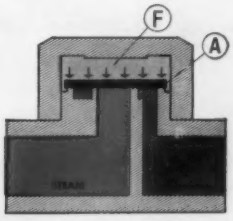
**3.** Direct steam jet across bottom of Sarco valve disc. This creates **low-pressure** area under disc—resulting in **downward** valve-closing force.




**A.** Inlet pressure raises disc "A" from seat . . . immediate discharge of air and condensate.

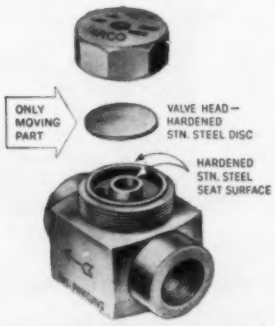



**B.** Steam follows condensate and the high velocity jet across bottom of disc "A" creates low pressure area (Bernoulli effect) . . . jet is deflected into chamber "F" where it builds up pressure by recompression and this pressure acts on top of disc "A" . . .




**C.** Pressure in chamber "F", acting on full top area of disc "A", exceeds force of incoming steam and low pressure area under disc . . . and immediately forces it down, closing inlet. As condensation decreases pressure in chamber "F", disc rises and steps A or B repeat.

*No other steam trap like it!* The Sarco TD embodies the most important advance in steam trap design in years . . . the thermodynamic principle. Introduced in 1953, the Sarco TD has been thoroughly service-proven. Thousands have been installed . . . are providing a level of trapping efficiency and economy heretofore unobtainable.




**Small size . . . large capacity**

Only 3 parts . . . all stainless steel. Sizes ⅜ to 1"—each body is as small as a tee fitting! Capacity is determined not by a bulky body but by the effective orifice, valve action, pressure drop and condensate temperature.

**A FEW OF MANY ADVANTAGES**

- *Practically no maintenance*—no valve mechanism, no narrow channels. Trouble-free, simple design.
- *Cuts trap inventory*—one large capacity seat for all pressures . . . for heavy, light or no condensate load.
- *Self-adjusting for pressures 10 to 600 psi*—not a single change or adjustment required.
- *Operates perfectly when pressure fluctuates*—throughout full pressure range.

**See for Yourself**

We will gladly send you a Sarco TD Steam Trap and strainer for 60-day trial. No cost or obligation. You buy the TD *only* if you're completely satisfied. Advise size—⅜, ½, ¾ or 1"—and application. Sarco Company, Inc., Empire State Bldg., New York City.

2205-C

**SARCO Thermo-Dynamic STEAM TRAP**

THE MODERN TRAP THAT IS MAKING STEAM TRAPPING HISTORY!

**For more facts circle 568 on Reply Card**

## Argonne Launches the Argonaut To Teach Nuclear Reactor Practice

ARGONAUT—a new educational training reactor at Argonne National Laboratory, has been demonstrated as a low cost "do-it-yourself" reactor. The conceptual design of the Argonaut was developed under the direction of Dr. B. I. Spinrad, Associate Director of the Laboratory's Reactor Engineering Division; David H. Lennox, of the same division, served as Project Engineer.

Three criteria guided the design and construction of this reactor: It had to be useful for reactor research and training; it had to be ultrasafe; it could cost no more than $100-000. This reactor went critical on February 9, 1957, during the dedication of Argonne's Experimental Boiling Water Reactor, the first plant-size power reactor in the nation.

The Argonaut is a low power, low cost reactor of wide flexibility. It was developed primarily for use by students attending the Laboratory's International School of Nuclear Science and Engineering, where courses are taught in reactor theory and nuclear physics. It is designed to operate at an intermittent power development of 10 kilowatts.

Students may participate in observing the behavior of the reactor as fuel is added to it to make it critical. A self-sustaining chain reaction can be achieved with many different shapes of fuel loading and correspondingly different critical masses.

The reactor can be used for non-destructive chemical analysis, in which a sample is irradiated in order that the characteristic radioactives of its constituents may be examined.

It may also be used as a source of radiations for instrument calibrations and shielding tests and in particular as a neutron source for studies on properties of new reactor designs.

## Aircraft Industry Gets First Milling Machine Designed for Numerical Control

ELECTRONICALLY CONTROLLED, a machine tool that will substantially reduce lead time in the production of military planes and missiles has been demonstrated by the Martin Aircraft Co. and Bendix Aviation Corp.

It is the first airframe production automation system to be built in the U. S., and is described as the first practical application of a punched-tape control system to a three-dimensional milling machine or any other large-scale machine tool.

Built to specifications for Martin by Bendix, the system uses electronics to put coded information from a blueprint on tape and then read it in actuating a 50-ton milling machine that automatically turns out finished, precision-built aircraft and missile structural parts.

It will eliminate many weeks of tool setup and tool change time, normally requiring handmade shaping tools, templates, patterns and models.

Although many of today's conventional machines have been fitted with numerical control, the Martin system is the first in which a machine has been specifically designed to fit a numerically controlled milling system.

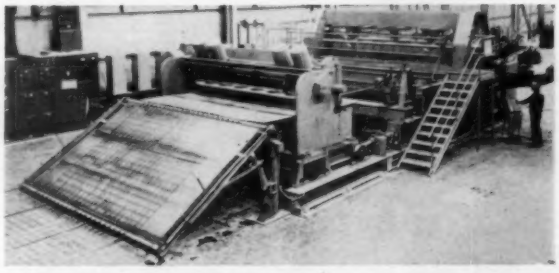
Required to operate the system are a numerical processor, Flexowriter operator, computer operator, and machine operator. The machine itself was fabricated by the Kearney & Trecker Co., Milwaukee.

## Wire-Fed Machine Turns Out Welded Web of Steel Wire for Reinforcing Concrete

CLEVELAND'S FIRST welded wire fabric machine is now operating at the Cuyahoga Works of U.S. Steel's American Steel and Wire Division. The machine is more than 10 ft tall and 132 ft in length.

Mounted at the rear are 49 reels, containing from two to four miles of wire. The reels turn in unison, feeding the steel wire into the machine, and a web of steel wire is formed and automatically welded.

Welded wire fabric is composed of longitudinal and transverse wires spaced from one to 16 in. apart, a spacing predetermined by setting a dial on the control panel. As the wires enter the machine, mechanical fingers position them and sets of electrodes weld them at the cross points. This machine can produce fabric up to 13 ft in width.



Each of the two machines soon to be in operation at the plant will produce some 1700 tons of welded fabric a month, at capacity speed. The finished fabric is used almost exclusively as reinforcement for concrete.

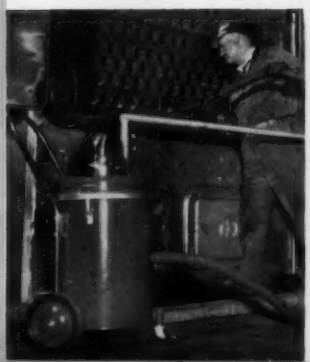
# New Black & Decker Furnace Cleaner POWER-Packed for Fast Cleaning

SOOT VANISHES FAST with powerful suction of B&D #648 Furnace Cleaner powered by big 1¼ HP Motor.

No. 39242 ACCESSORY ASSORTMENT converts your #65 Vacuum Cleaner for fast, easy furnace cleaning.

RUGGED SEMI-RIGID HOSE (1¼" diameter) and special Orlon bag make #648 a powerful addition to your cleaning equipment.

SEE SWIFTY SERVICE for longer life, better performance from your B&D Tools. Look in Yellow Pages for Factory Service Branch.



## Powerful B&D Furnace Cleaner plus unique idea speeds cleaning work

The new B&D Furnace Cleaner is a real boon to cleaning boiler tubes—increasing furnace efficiency. Powerful—its big 1¼ HP motor provides tremendous suction. Special Orlon bag acts as a second filter, resists charring, acids, mildew; eliminates clogging. Large wheels make maneuvering stairs a cinch.

Add this unique idea from a user and you obtain a plus from your B&D Furnace Cleaner! User reports cleaning his furnace every week meant emptying the tank 2 or 3 times a cleaning—slowing up the job. Now, he empties the tank once every two weeks! Here's how he does it. Cut an inlet and outlet as close to the top lip of a 55 gallon drum as possible. Make connections with 1½" or 1⅝" pipe. Connect hose to vacuum cleaner inlet and drum outlet. Attach cleaning hose to drum inlet. Dirt passes from furnace to drum—overflows into cleaner bag. Result—emptying time slashed 6 to 1—cleaning time drastically reduced.

Call your B&D distributor for a free demonstration or write: THE BLACK & DECKER MFG. CO., Dept. 0807, Towson 4, Md. (In Canada: P.O. Box 278, Brockville, Ontario)

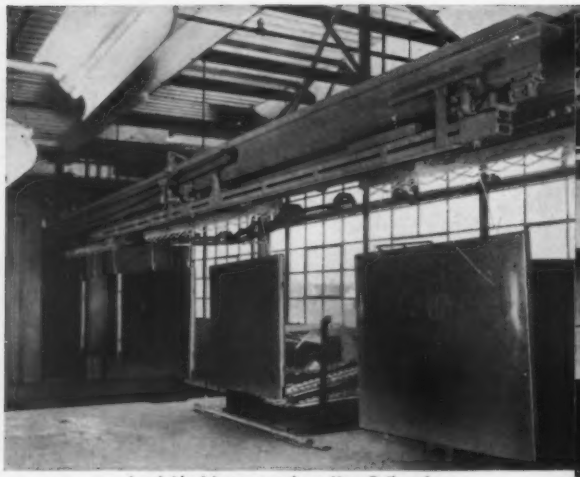
Look Under "TOOLS-ELECTRIC" in Yellow Pages

Leading Distributors Everywhere Sell

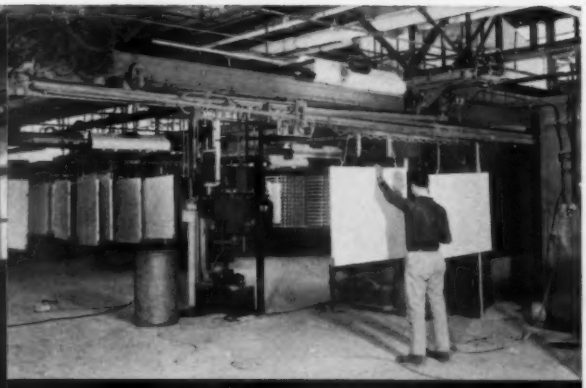
B&D Black & Decker®

Quality Electric Tools—Power-Built to set the pace

For more facts circle 569 on Reply Card

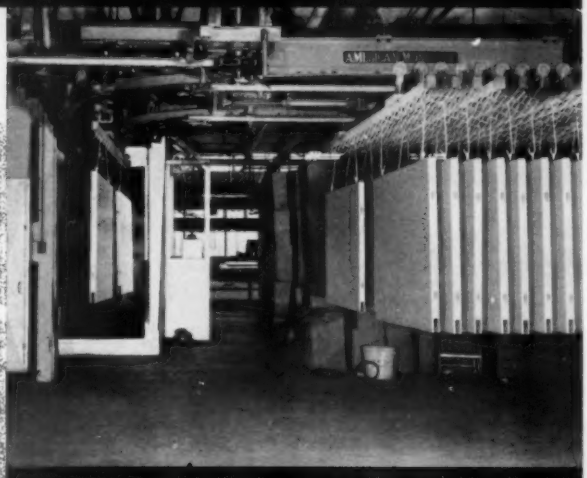


Landahl picks up panels as MonoRail pushes them from degreasing.



MonoRail pneumatically pushes a "car" of panels into a finish spray booth.

# Automatic Finishing with Power LANDAHL and AMERICAN MONORAIL



Finished panels are pushed by MonoRail from the bake oven.

Space was saved and automatic finishing achieved by combining two overhead handling systems.

American MonoRail cars carrying metal panels move through degreasing, priming, finishing and baking. In each operation either loading or unloading is performed automatically by power — the Landahl Chainless Conveyor acting as a "pusher" over most of the system.

Here is "team work" engineering to take advantage of the flexibility of both American MonoRail and Landahl Chainless Conveyors.

This efficient system is installed at Fostoria, Mfg. Co., Fostoria, Ohio, for finishing metal panels for office partitions.

For details on how American MonoRail or Landahl Conveyors can cut your handling costs, write today.

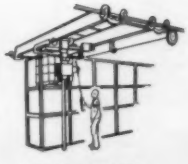
Member of The Materials Handling Institute, Inc. & MonoRail Manufacturers' Association.

For Power Driven Conveyors, Use Landahl Chainless Conveyors

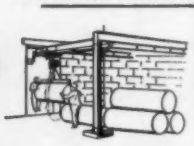
AMERICAN
MONORAIL
COMPANY

13123 ATHENS AVENUE, CLEVELAND 7, OHIO (IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)

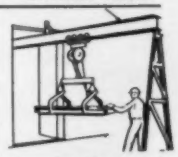
AUTOMATIC DISPATCH



STACKER CRANE



MANUAL MONORAIL

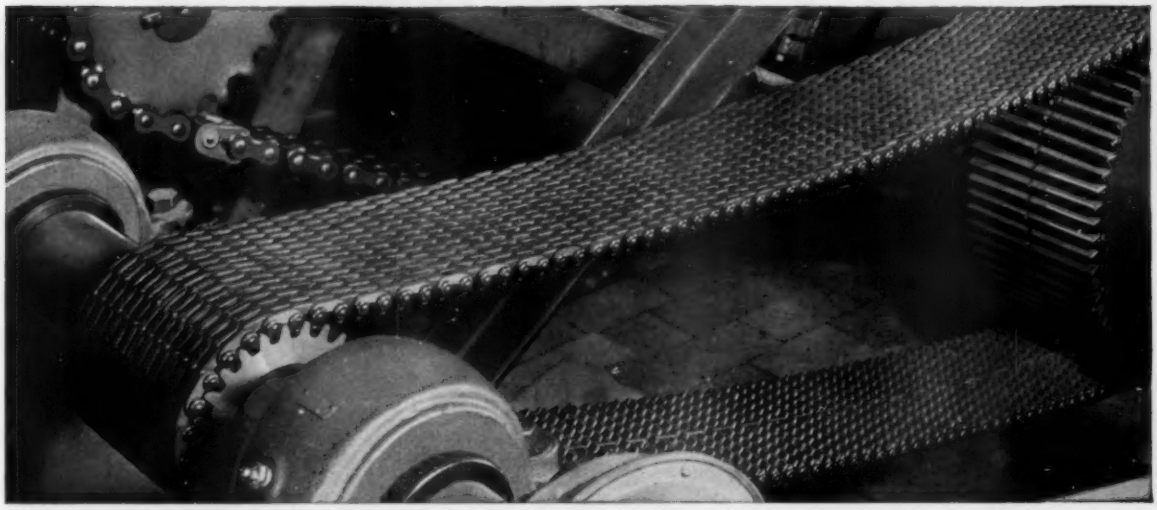


RETRACTABLE CRANE

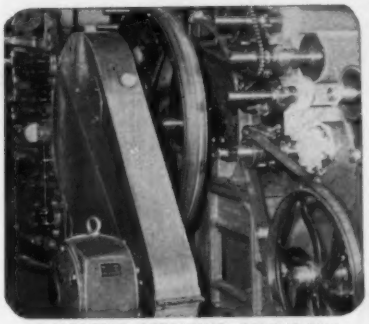
For more facts circle 570 on Reply Card

# Check your drives against the benefits of

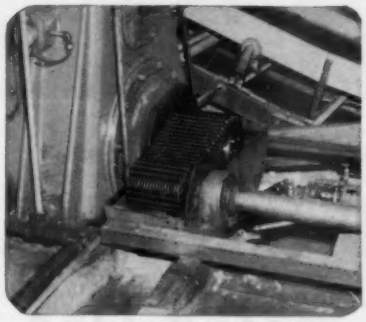
# LINK-BELT silent chain



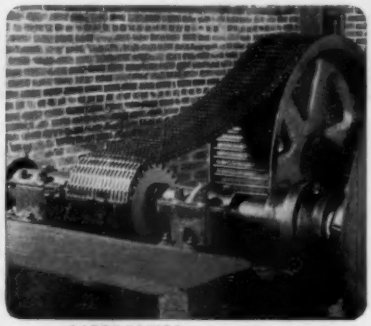
☐ **HIGH SPEED.** Link-Belt silent chain drives are noted for slipless dependability—maintain better than 98% efficiency whether operating over large or small diameter wheels or on long or short centers. For further details on these and more advantages, call your Link-Belt office or authorized distributor.



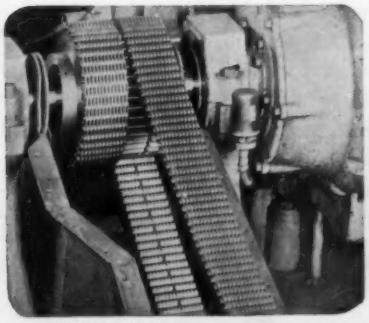
☐ **ADVERSE OPERATING CONDITIONS.** Heat, humidity, cold do not lower Link-Belt silent chain's great efficiency.



☐ **LARGE OR SMALL HP.** A versatile line, these Link-Belt drives are available from fractional to thousands of hp.



☐ **LARGE RATIOS.** Link-Belt silent chain operates efficiently on extremely short centers at ratios as high as 10-to-1.



☐ **LIMITED SPACE.** Easy to assemble in close quarters, Link-Belt silent chain permits built-in drives, compact housings.

☐ **LONG LIFE.** After 13 years on this newspaper press at speeds up to 4,700 fpm, Link-Belt silent chain is still efficient.

Ask for 88-page Book 2425 — complete data on Link-Belt silent chain drives.

**LINK-BELT**

14,035

**SILVERSTREAK SILENT CHAIN DRIVES**

**LINK-BELT COMPANY:** Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

**For more facts circle 571 on Reply Card**

The concrete silos of this Midwest plant are protected with Parlon weatherproof paint. Silos were then given a Parlon-aluminum topcoat to reflect sun's rays, to keep silo interiors cool, and to give additional protection against moisture penetration.

# SPARKLES IN THE SUN... SHEDS WATER LIKE A DUCK

***... because it's protected with Parlon®***

In the Farm Belt of Indiana these towers stand out like a beacon. Their striking sparkle is due to a Parlon-fortified coating combined with aluminum paste.

"But," reports Mr. Walter Brassert, President, Concrete Silo Company, Bloomfield, Indiana, "appearance was only one of the requirements. We needed a finish to give complete assurance that moisture will not reach the contents of the silos. The Parlon coating sheds water like a duck when we have driving rains and makes a wonderfully lasting coat of paint."

Such testimonials are not unusual for Parlon-based formulations. Whether you need a finish to withstand the corrosive attack of acid, alkali or water; whether you need to protect metal, concrete or wood—you'll find a Parlon formulation ideal for your specific requirements. Paints containing Parlon chlorinated rubber are available from 400 manufacturers under their own brand names. Or, for more information, write:

*Cellulose Products Department*

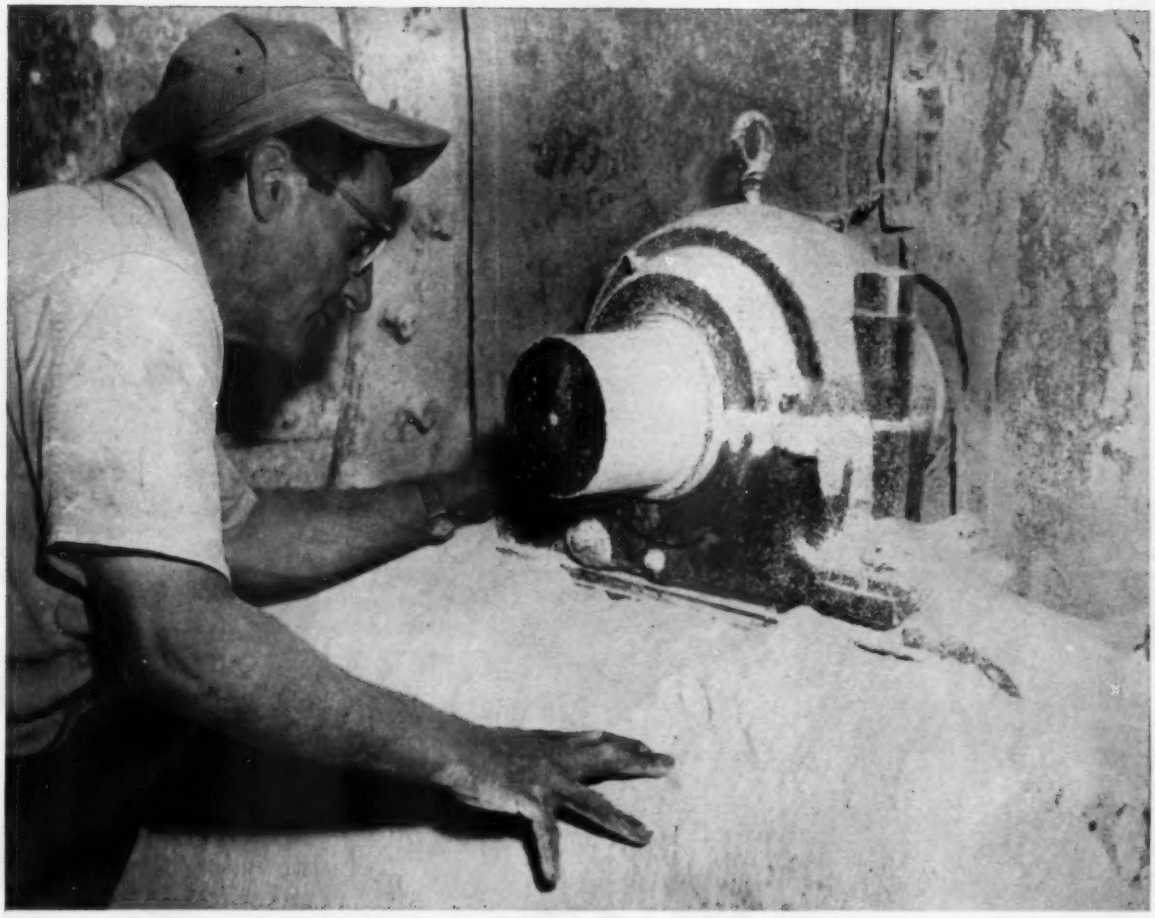
***HERCULES POWDER COMPANY***

INCORPORATED

*966 Market Street, Wilmington 99, Delaware*

®R57-3R

**For more facts circle 572 on Reply Card**



# Maintenance cut 49% with SKF® anti-friction bearings

**SKF** "Triple-Seal" Pillow Blocks, used by an eastern limestone producer in pulverizing tube mills, have saved thousands of dollars since their installation in 1948.

In comparable operating periods, counter-shaft failures dropped from 11 to 2, bearing maintenance costs were cut 49%, production increased 70%, power savings averaged 10% to 20%.

Required to operate in a highly abrasive "snowstorm" of powdered limestone, these triple-sealed units continue to save money for the user. They will do the same for you.

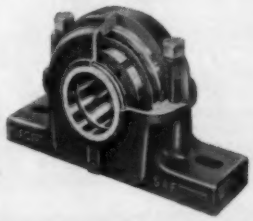
For further information on how these remarkable "Triple-Seal" Pillow Blocks can be applied most effectively to your products, get in touch with your local **SKF** Sales Office. 7758

**SKF**

EVERY TYPE—EVERY USE

*Ball Bearings*
*Cylindrical Roller Bearings*
*Spherical Roller Bearings*
*Tapered Roller Bearings ("Tyson")*

*Reg U.S Pat Off Tyson Bearing Corporation



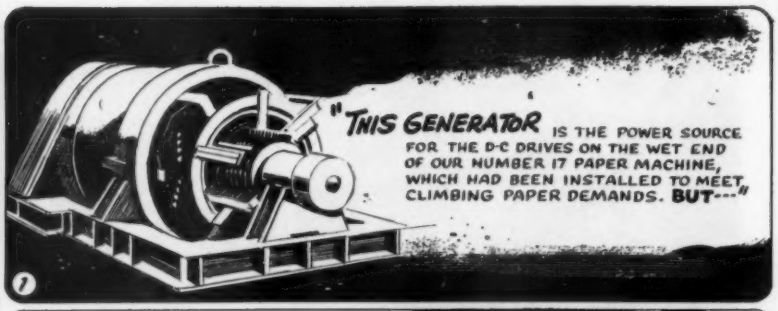
**SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.**

**For more facts circle 573 on Reply Card**

"WE HAD TO UNRAVEL COSTLY THREADS"

A GENERAL ELECTRIC CARBON BRUSH CASE HISTORY

AS TOLD BY
Nelson Allen
SUPERINTENDENT, ELECTRICAL MAINTENANCE
SCOTT PAPER CO.
CHESTER, PA



1 "THIS GENERATOR IS THE POWER SOURCE FOR THE D-C DRIVES ON THE WET END OF OUR NUMBER 17 PAPER MACHINE, WHICH HAD BEEN INSTALLED TO MEET CLIMBING PAPER DEMANDS. BUT---"

2 "WITHIN A YEAR, THE COMMUTATOR ON THIS GENERATOR BECAME **THREADED** AND ROUGHENED. SPOT REPAIRS WERE NECESSARY TO KEEP EVERYTHING RUNNING OK UNTIL THE ANNUAL MAINTENANCE SHUTDOWN. AT THAT TIME THE COMMUTATOR HAD TO BE STONED--- A TIME CONSUMING AND COSTLY EXPERIENCE"

3 "THREADING PERSISTED. NO MATTER WHAT ADJUSTMENTS WE MADE, FREQUENT MAINTENANCE WAS NECESSARY. FACED WITH CONTINUING THIS EXCESSIVE AND WORRISOME MAINTENANCE, WE CALLED OUR GENERAL ELECTRIC REPRESENTATIVE."

4 "WHICH ONE OF MANY VARIABLES WAS THE KEY TO OUR PROBLEM? THE G-E ENGINEER STUDIED EVERYTHING--- OPERATING AND LOAD CHARACTERISTICS, ATMOSPHERE, COMMUTATOR, CARBON BRUSHES AND HOLDERS."

5 "THIS GENERATOR', HE SAID, 'OPERATES MOSTLY UNDER **LIGHT** AND **VARYING LOADS.** THIS CAN DISTURB NORMAL COMMUTATING CONDITIONS. YOU NEED CARBON BRUSHES SPECIALLY DESIGNED TO GIVE GOOD COMMUTATION ON SUCH SERVICE, AND I RECOMMEND THIS G-E TREATED BRUSH."

6 "AND RIGHT HE WAS! SINCE SWITCHING TO THESE G-E BRUSHES THREADING AND ROUGH COMMUTATOR CONDITIONS ON 17's GENERATOR HAVE BEEN ELIMINATED, REDUCING MAINTENANCE TIME AND EXPENSE.-- THANKS TO G.E.'S ENGINEERING ASSISTANCE AND COMPLETE LINE OF CARBON BRUSHES"

NO MATTER WHAT BRUSHES YOU NEED FOR YOUR G-E MACHINES, GENERAL ELECTRIC CAN SERVE YOU FROM ITS COMPLETE LINE OF CARBON BRUSHES, READILY AVAILABLE, AND BACKED BY ENGINEERING ASSISTANCE.

AND REMEMBER-

GENERAL ELECTRIC IS THE ONLY MANUFACTURER OF BOTH CARBON BRUSHES AND MOTORS AND GENERATORS.

CONTACT YOUR G-E APPARATUS SALES OFFICE OR DISTRIBUTOR, OR WRITE FOR BULLETIN GEA-5547, GENERAL ELECTRIC CO., SECTION 774-4 SCHENECTADY, N.Y.

*Progress Is Our Most Important Product*

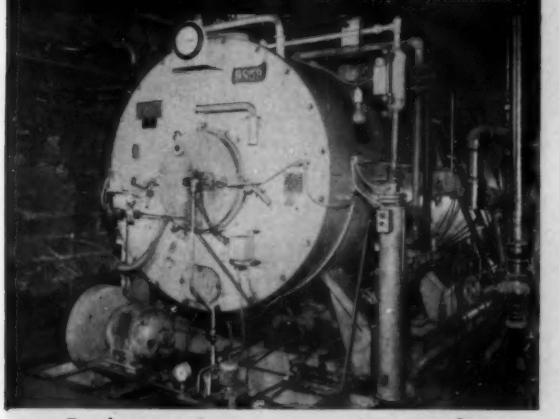
GENERAL ELECTRIC

For more facts circle 574 on Reply Card

# STEAM GENERATING PROBLEMS SOLVED

## . . . a report

## by AMESTEAM GENERATOR

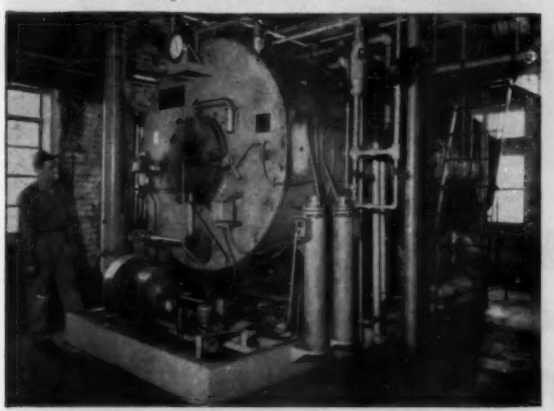


Food processing steam requirements from lowest demand days to full capacity easily handled by this AMESTEAM GENERATOR.

**". . . most economical and trouble-free unit we have owned in our thirty years", writes J. J. Giammalvo about his AMESTEAM GENERATOR.**

"...the boiler operates with a minimum of maintenance beyond opening and cleaning for annual inspection. It easily handles our steam requirements from the lowest demand days to full rating when our dryers and condensers are being used to capacity, operating faithfully, week after week, burning No. 6 fuel oil.

"This boiler, installed on January 5, 1951, has been by far the most economical and trouble-free unit we have owned in the thirty years we have been engaged in the manufacture of cheese and other dairy products . . ."

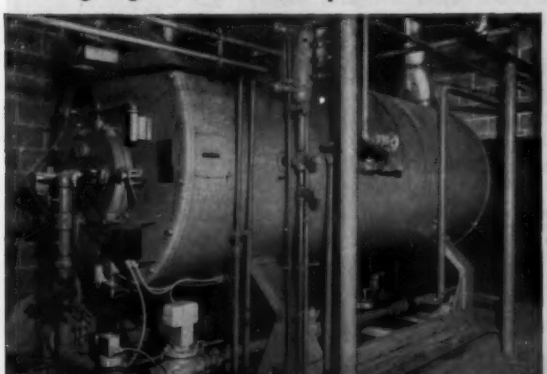


Space problem solved by compact AMESTEAM GENERATORS dependably serving large Pure Food Factory.

**Food plant appreciates space savings, performance and service.**

"Up to the time we purchased your AMESTEAM GENERATORS, we were users of coal", writes Erwin C. Meyer of "HANSA" Pure Food Factory, Mamaroneck, N.Y. "We needed new boilers, so the writer studied different makes of steam generators and finally decided on your generator because it was so compact and complete.

". . . the new AMESTEAM GENERATORS are in their new boiler house and we are well pleased with their performance. We require very little service from you. The service you rendered was prompt and very cordial. It was a pleasure and it is a pleasure to do business with your firm."



Space-saving, efficient AMESTEAM GENERATOR delivering dependable steam for Gates Rubber Company.

**At Gates Rubber Company—"very reliable and entirely satisfactory".**

Robert L. Hall of Gates Rubber Company Sales Division, Inc., reports on the AMESTEAM GENERATOR in the firm's Sioux City, Iowa plant:

"We have found this equipment to be very reliable and entirely satisfactory in our application. The boiler has carried the maximum load that we have required of it and we have absolutely no mechanical or electrical difficulties since its installation" (May, 1956).

". . . we had occasion recently to inspect the boiler internally, and it was found to be in excellent condition in every respect".

**WHAT'S YOUR STEAM PROBLEM?**

If you need 10 to 600 HP and want the kind of space-saving, trouble-free service enjoyed by these owners of AMESTEAM GENERATORS, write today for our catalog and the name of your nearby AMESTEAM dealer.

**AMES IRON WORKS INC.**

BOX M-77 OSWEGO, N. Y.

For more facts circle 575 on Reply Card

# Big, costly loads are safe with Acco Registered® Sling Chains

• Pictured above is a huge, 35,000-pound casting being lifted *easily and safely* by a 4-leg ACCO *Registered* Sling Chain. Directly beneath the load is a highly polished and machined crank shaft worth many thousands of dollars.

Imagine the cost in lost labor and materials, should the sling chain fail! But it won't fail—for this ACCO *Registered* Sling Chain and all its components have the inbuilt strength needed to handle the job with complete safety!

When you buy an ACCO *Registered* Sling Chain, you get these four exclusive "plus values" which *add materially to the worth, but not to the cost,* of the sling:

1 • **Accoloy X-weld 125 Chain**, for extra strength. This chain hangs straight . . . does not kink . . . has extra resistance to bending.

2 • **New Shaped Master Link**, uniquely shaped to withstand deformation under loads up to 18% greater than a round-section link can do.

3 • **ACCO Registration Ring**, serially numbered as evidence that the assembled sling has been factory proof-tested to twice its working load limit.

4 • **Registration Certificate**, signed by us, attesting to the field-tested design and proof-testing of the complete sling.

Remember, the best sling is one of your most economical material-handling tools. You'll find it good business to consult your ACCO *Registered* Sling Chain Distributor on all your sling needs; his counsel is available without obligation. If you don't know his name, write us at York, Pa.

**WHAT "ACCO REGISTERED" MEANS**

1 The best material
2 Unit safety factor (on bodies, rings, links, hooks)
3 Proof test of complete sling to twice the working load limit
4 Actual field service test of each design
5 Metal identification ring on each sling
6 Signed Registry Certificate with each sling

**American Chain Division**
**AMERICAN CHAIN & CABLE**
**Bridgeport, Conn. • Factories: *York and *Braddock, Pa.**

Sales Offices: *Atlanta, Boston, *Chicago, *Denver, Detroit, *Houston, *Los Angeles, *New York, Philadelphia, Pittsburgh, *Portland, Ore., *San Francisco

ACCO TRADE MARK

*Indicates Warehouse Stocks

**For more facts circle 576 on Reply Card**

# why wonder?

You can be sure you're getting a ready-to-go steam trap when you buy a Nicholson . . . because each and every one is tested in actual steam service before shipment.

And that's not all. With just one thermostatically-operated moving part, there's nothing to get out of order, nothing to go wrong. Nicholson means continuous operation of your steam-using equipment . . . no downtime from trap failure.

- **high air-venting capacity . . . for faster warmup of equipment.**
- **powerful valve action . . . no mechanical linkages to cause trouble.**
- **small and lightweight . . . easy to pipe and support.**

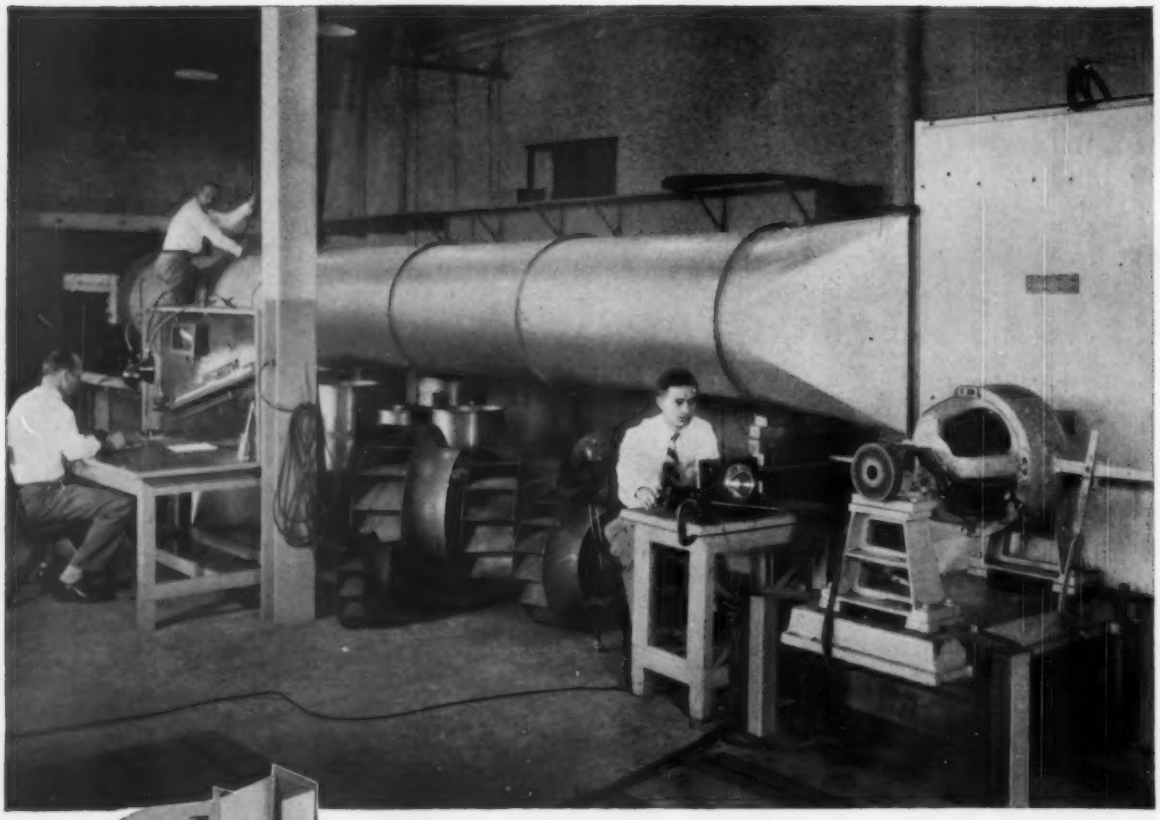
So, to get a trap that's service-tested, and loaded with operating features, specify Nicholson. W. H. NICHOLSON AND COMPANY, 14 OREGON ST., WILKES-BARRE, PA., *Sales and Engineering offices in 98 principal cities.*

*Write for Bulletin 1055*

**NICHOLSON**

*of Wilkes-Barre*

**For more facts circle 577 on Reply Card**



*Complete Test Setup at "Buffalo" to Check Fan Wheel Performance Over Entire Range of Operation.*

*92% Mechanical Efficiency — attained by the "Buffalo" Airfoil Fan.*

*"Buffalo" Type BLH Fan for Classes II - IV air handling.*

## WE PAY THEM NOT TO BE SATISFIED —SO THAT YOU WILL BE!

Fan designing and testing at "Buffalo" are jobs that are never "completed" — because once an improved model tests out, our engineers go back to work on a better one!

That's the spirit of dissatisfaction which developed the series of "Buffalo" Airfoil and Semi-Airfoil Fans with choice of wheels to match widely varying requirements — the Types BL and BLH Fans to cover all pressure classifications. And though these fans have set new records for efficiency and stable performance, the work still goes on toward even higher goals. Meanwhile, you get the benefits: the best of hundreds of tested fan designs — the most complete selection of fans for the exact performance you require — the *"Q" Factor or built-in Quality which provides trouble-free satisfaction and long life.*

Write for Bulletins F-200 and FD-106. See why "Buffalo" means a better fan buy.

**BUFFALO FORGE COMPANY**
BUFFALO, N. Y.

"Buffalo"

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

**For more facts circle 578 on Reply Card**

# CUT COSTS

*with the Original Mead*

# MIDGET AIR CLAMP

*(Spring Return Air Cylinder)*

***In assembly jigs and other multiple applications, this new, low cost pressure unit saves countless man-hours. As a work-ejector in many fixtures, it is unexcelled.***

## *Advantages over mechanical clamps*

**1** **All Air Clamps** in any set-up can be operated by a single master valve—the "lock-up" and release of assemblies is instantaneous.

**2** **May be installed in cramped corners** difficult to reach with bulky mechanical clamps. Mead Midget is the most compact air cylinder, for its power, on the market.

**3** **Equal ram pressure at any point** along stroke, making special, delicate adjustments unnecessary.

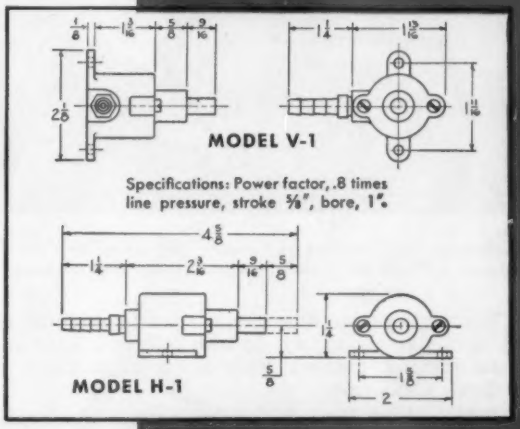
**4** **Independent group control.** Any desired group of "Midgets" can be controlled independently of any other group in an assembly—as where primary members of the fixture must be locked up before the secondary members.

**5** **Facilitates delicate drill operations.** Air Clamps actuated by foot control valves leave operator's hands free to handle the work pieces.

*Send for all the interesting facts on these time-tested, superior Midget Air Clamps.*

**MEAD SPECIALTIES COMPANY**

**4114 North Knox Avenue • Dept. P-77 • Chicago 41, Illinois**




**IMMEDIATE DELIVERY**

*Single-acting cylinders delivered from stock; double-acting in a few days.*

**Tear Out MEMO Coupon Now For**

***New* MEAD INDUSTRIAL AIR POWER CATALOG**

full of suggestions for faster, cheaper production with famous MEAD AIR-POWERED Cylinders, Valves, Presses, Vises, Chucks, Hammers, Drill Press Feeds, Work Feeders, semi-automatic combinations, etc. Send today.

***Memo Coupon***

**MEAD SPECIALTIES CO.**
4114 N. Knox Ave., DEPT. P-77, Chicago 41, Illinois

Send free copy of new, colored MEAD INDUSTRIAL AIR POWER CATALOG describing the complete line of famous Mead air-operated devices.

Name_____

Company_____

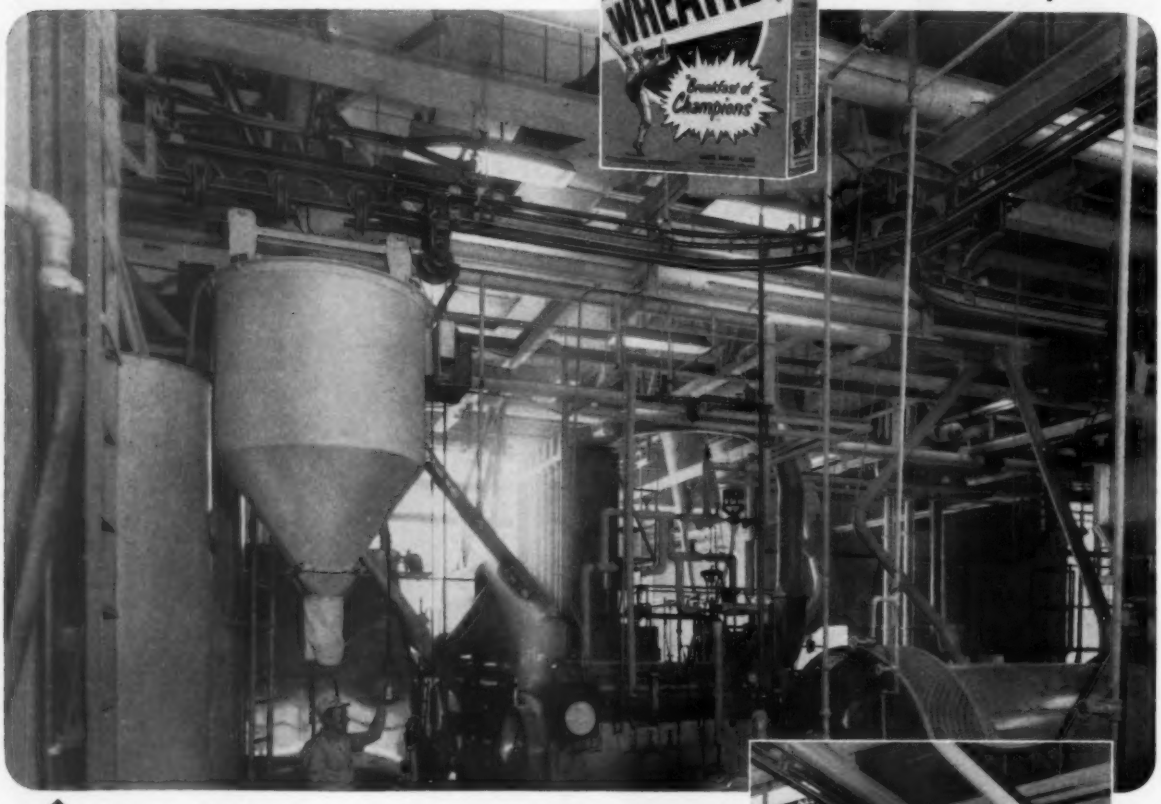
Address_____

City_____ Zone____ State____

**For more facts circle 579 on Reply Card**

# BUCKET SYSTEM SPEEDS PRODUCTION

## Handles Wheat for 108,000 Boxes Daily

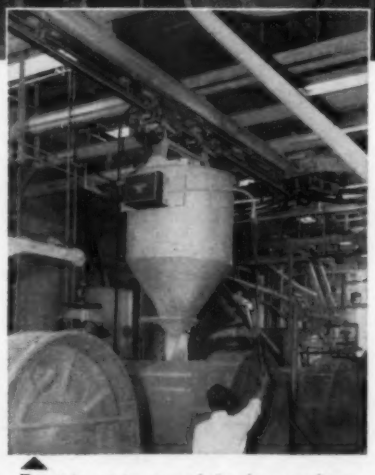


▲ Buckets are filled with cracked wheat here. A Tramrail track scale weighs the wheat and shuts it off automatically when a bucket has full weight.

THE appetite for Wheaties is countrywide and requires many food plants to satisfy. To take care of a large part of the west coast demand, General Mills has a large, clean, modern plant at Lodi, California.

A Cleveland Tramrail bucket system consisting of a bucket on a motor-driven floor-controlled carrier handles wheat for the Wheaties to four cookers. The wheat is piped directly to the buckets by a duct from the floor above. It is weighed automatically by a track scale in the Tramrail system. When the exact amount is in a bucket, a valve shuts off the flow to the bucket.

This installation illustrates one of the hundreds of ways Cleveland Tramrail is being used to make materials handling easier, faster, safer, and less costly.



▲ Emptying into one of the four cookers.

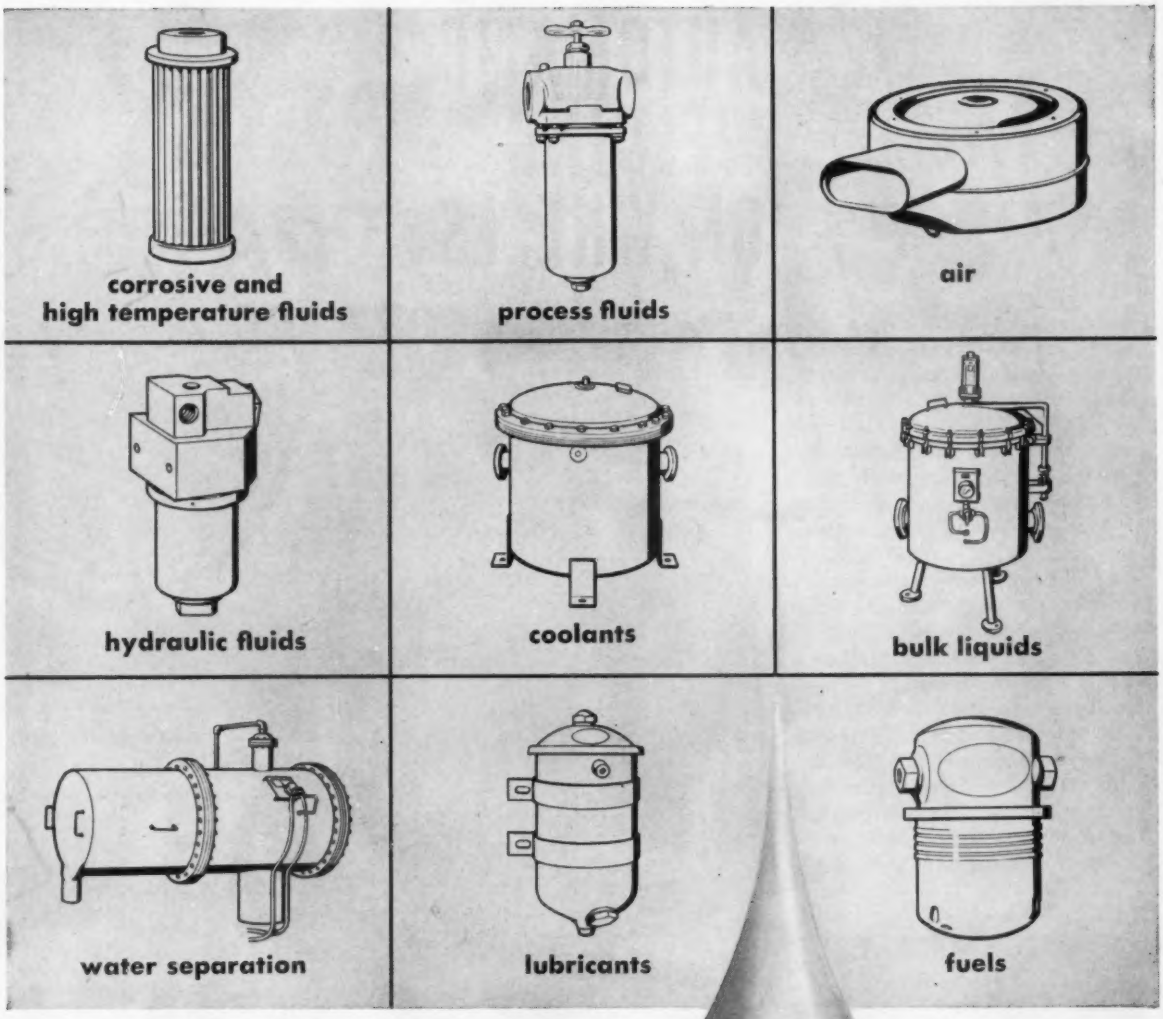
*GET THIS BOOK!*

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy

**CLEVELAND TRAMRAIL DIVISION**
THE CLEVELAND CRANE & ENGINEERING CO.
7511 East 290 Street, Wickliffe, Ohio

**CLEVELAND TRAMRAIL**
**OVERHEAD MATERIALS HANDLING EQUIPMENT**

For more facts circle 580 on Reply Card




There are over 2,000 filter types available right now from Purolator. Before you consider special, custom made filters, let Purolator know your filtration problem. Write Purolator Products, Inc., 970 New Brunswick Ave., Rahway, N. J.

# There's a Purolator filter for every known fluid

*Filtration For Every Known Fluid*

**PUROLATOR**

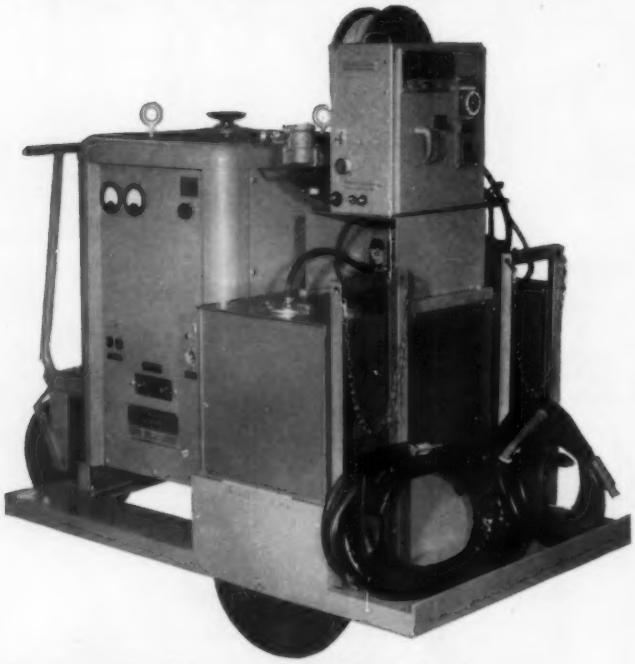
**PRODUCTS, INC.**

Rahway, New Jersey and Toronto, Ontario, Canada
Agents in principal cities.

For more facts circle 581 on Reply Card

# AUTOMATIC WELDING ON WHEELS

## New, Westinghouse PORT-ARC



### All the Speed and Economy of Automatic Welding!
### All the Portability with Ease of Any Hand-Welding Machine!

PORT-ARC . . . the most *versatile*, inert or $CO_2$ gas welding machine ever designed! Complete automatic welding, quickly wheeled into position for production runs! Or, efficient hand welding, "*anywhere*", for emergency repairs, maintenance, countless applications!

The PORT-ARC is complete, with its own constant potential (RCP) direct-current rectifier arc welder. This model SA-30P is particularly well suited for semi-automatic, full automatic and for plug or tack welding. Yet, it is easily portable, on its own lightweight carriage, for virtually *any* "on-the-spot" application!

PORT-ARC is extremely easy to use. *Everything* is automatic! From feeding electrode wire into the arc at a constant rate, to controlling the flow of shielding gas and the gun-cooling water.

It produces welds of excellent physical properties and appearance, with MS-20 wire, at high burn-off rates; utilizing only a minimum of argon shielding gas. Or, PORT-ARC also employs the exceptional Westinghouse MS-21 wire and $CO_2$.

Three specially designed, water-cooled nozzles—with an adapter for easy attachment—are available for plug or tack welding on flat surface applications, inside corner welds, or outside corner welds. J-22086

**POWER-UP with Westinghouse welding equipment**

### Only Westinghouse offers such welding leadership!

Get complete PORT-ARC information from your Westinghouse welding distributor. Or, write Westinghouse Electric Corporation, Welding Department, P. O. Box 868, Pittsburgh 30, Pennsylvania.

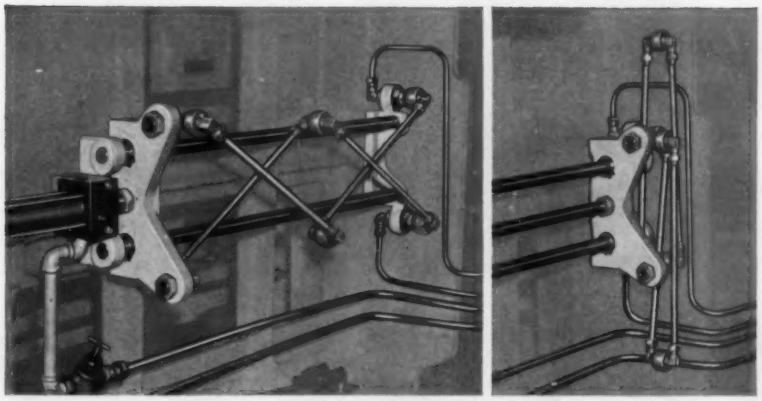
**YOU CAN BE SURE... IF IT'S Westinghouse**

**For more facts circle 582 on Reply Card**

IN EQUIPMENT DESIGN ■

# CHIKSAN SWIVEL JOINTS

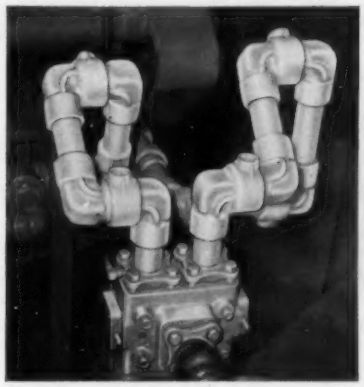
## SMOOTH OUT KNOTTY LINE PROBLEMS



**STEEL LINES FOLD LIKE AN ACCORDION**

**Connected to a moving head, these compact swivel jointed all-metal hydraulic lines flex and fold like an accordion on this automatic bottle unpacking machine.**

When a machine's moving parts cause tight bend or twist on hose lines, Chiksan Swivel Joints provide a ready solution. When design dictates the use of metal lines, Chiksan Swivel Joints allow rubber-like flexibility. In fact, wherever line flexibility is required, designers and maintenance engineers know it's just good business to call on Chiksan. Precision made Chiksan Swivel Joints with their infinite service life, full 360° rotation and high safety factor, quickly pay for themselves by minimizing hose replacement and eliminating costly line failure, fluid loss and downtime. If your equipment hose lines require frequent replacement due to torsion or bend radii fatigue, or if flexible all metal lines are in order, contact Chiksan. A nearby representative will call, analyze your requirements, and make specific recommendations. Write today for his name.

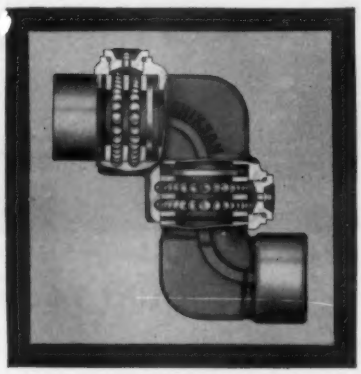


**NO HOSE BURST HERE**

**These Chiksan swivel jointed steel lines on a die casting machine eliminate damaging hose ruptures, reduce fire hazard, fluid loss and setup time by 75%.**

**NO BEND FATIGUE HERE**

**This highly specialized lens grinder utilizes Chiksan Swivel Joints to eliminate tight hose bend as the multiposition head is shifted from one grinding position to another.**



**LOOK INSIDE A SWIVEL JOINT**

**Detailed attention to detail. Precision machining and specific packing seals for specific services. These are the quality-plus features built into every Chiksan Swivel Joint.**

*Please Address:*
*Dept. 227*

CHIKSAN

fmc A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

CHIKSAN COMPANY—BREA, CALIFORNIA • CHICAGO 5, ILLINOIS • NEWARK 2, NEW JERSEY

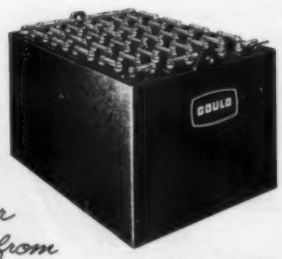
Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Subsidiaries: Chiksan Export Company • Chiksan of Canada Ltd.

**For more facts circle 583 on Reply Card**

## Gould Teamwork Scores for Battery Users:

Making sure that you get maximum service from your batteries is the full time job of Gould field engineers. They help set up your battery maintenance shop, help establish good preventive maintenance procedures, make routine calls to check up on conditions and instruct your new personnel in correct maintenance procedures. This teamwork costs you nothing . . . as a matter of fact, it can't help but *save* you money. Why not take advantage of it? See your local Gould representative; or write Gould-National Batteries, Inc., Trenton 7, N. J.

*Always use Gould-National Automobile and Truck Batteries*




Gould Industrial Truck Battery —America's Finest

*More Power to you from*

**gould BATTERIES**

©1957 Gould-National Batteries, Inc.

**For more facts circle 584 on Reply Card**

This Wissco Balanced Spiral Belt, in constant use 24 hours a day and five days a week, carries glass fiber mats through a 650°F drying oven at speeds up to 50 feet per minute.

# WISSCO BELTS *and the Texas Glass Fiber Corporation*

*The story of Wissco Belts is best told by their users.* For instance, Texas Glass Fiber Corporation of Grandview, Texas, reports:

**"The installation of a Wissco Belt speeded up our glass-curing operation by 250%!"**

This Wissco Belt is used in drying glass fiber mats impregnated with phenolic resin bonding material. The company's president, Mr. W. E. Hutton-Miller, reports: "Before we switched to Wissco Belts, this operation slowed up our production considerably.

"With our old, close-mesh belt, the lack of adequate circulating air greatly retarded the maximum flow rate through our drying oven. For instance, in drying glass air filter material, the greatest speed possible was 10 feet per minute. What's more, dripping resin continuaily clogged the small mesh holes, making it necessary to remove these deposits by banging the belt with a hammer. This, of course, did not do the life expectancy of the belt any good.

"Then a Wissco technical representative visited Texas Glass Fiber. He recommended that we change to an open-mesh Wissco Balanced Spiral Belt. Not only did the open mesh of this belt enable the fiber glass material to dry faster, but it also prevented dripping resin from clogging the belt.

"As a result, we were able to increase our belt speeds for air filter drying to 35 feet per minute. We find Wissco Belts superior in every respect to the belts we formerly used. In addition to increased production, these belts have brought us definite maintenance and replacement savings," Mr. Hutton-Miller concludes.

So—no matter what kind of operation yours is—it'll pay you to get the complete story on Wissco Belts, as well as free Wissco technical help, from our nearest sales office soon.

THE COLORADO FUEL AND IRON CORPORATION
Denver and Oakland
WICKWIRE SPENCER STEEL DIVISION
Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia
CF&I OFFICES IN CANADA: Montreal • Toronto

CF&I **WISSCO BELTS**
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

4548

For more facts circle 585 on Reply Card

# BUCYRUS-ERIE TRANSIT CRANES
## Give you "Most-Needed" Features

ABILITY to spot loads over a desired position, stability for heavy lifts, ease in getting from place to place — whatever you look for *first* in a material handling unit is yours with a Bucyrus-Erie Transit Crane's special combination of features. Here is just a sample of what you get:

**ACCURACY:** Power-controlled lowering on the main hoist line and independent boom hoist permit accurate positioning of loads.

**STABILITY:** I-beam, double-box outriggers stabilize machine, for the larger, heavier lifts.

**VERSATILITY:** Easily convertible to clamshell, dragline, shovel, or dragshovel, Transit Cranes are adaptable to many types of excavating and material handling work.

**MOBILITY:** The sturdy, custom-built carrier has variable speeds for quick, easy moves all around your yard.

**CONVENIENCE:** Jib extensions can be added to basic boom length without removing sheaves, guards, or suspension ropes.

**SAFETY:** Telescoping-type boom-stops help prevent boom from falling back over cab.

Transit Cranes — the 15-ton Model 15-B, 25-ton Model 22-B, and new 35-ton Model 30-B — can be counted on to give you the maximum return on your operating dollar. For more details on Transit Cranes or 5-ton and 10-ton capacity all-hydraulic Hydrocranes, see your nearby Bucyrus-Erie distributor today. 366E57

**For VERSATILE SERVICE**

. . . investigate the cost-cutting possibilities of a Bucyrus-Erie Hydrocrane! Telescoping boom, quickly-set outriggers, hydraulic power and controls, highway speeds up to 50 mph — these features and many more make the Hydrocrane ideal for small jobs and for those hard-to-reach places.

BUCYRUS ERIE South Milwaukee, Wisconsin

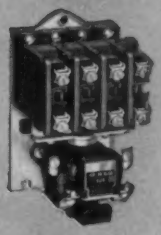
For more facts circle 586 on Reply Card

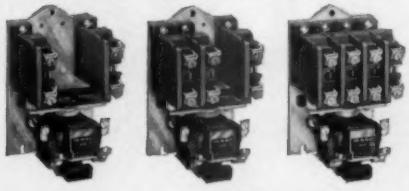
# From 5 basic models you get 10 standard relays with the new CLARK Type "PM" Relay line

## The 5 Basic Models

**SECTIONAL POLE CONSTRUCTION**—a new design concept for relays—provides units with 2 to 12 poles, with the greatest variety of combinations and pole arrangements available in an integrated 10-ampere line, and with a minimum of different parts to stock. Extra poles are available in kit form—assembled either normally open or closed. Coils and complete magnet assemblies are also available in kit form. Stocking of coils is simplified since one coil for a given voltage will handle any combination of 2, 3 or 4 poles normally open or closed, and for larger relays is correspondingly simple.

**No. 5U-4**
**Basic**
**4-Pole**

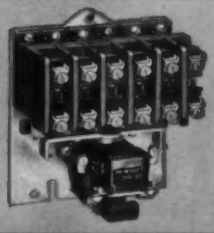


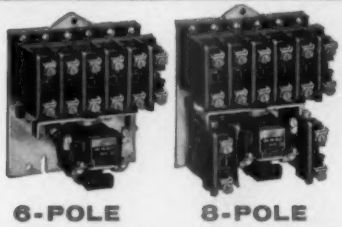


2-POLE 3-POLE 4-POLE

By removing one or two poles, the standard 4-pole unit becomes a 2 or 3-pole relay.

**No. 5U-6**
**Basic**
**6-Pole**

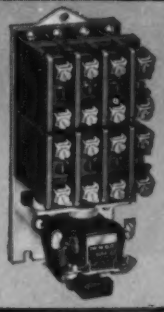


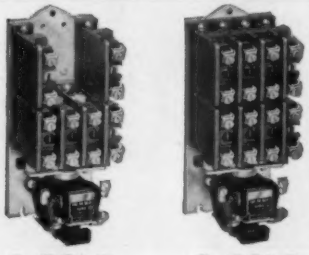


6-POLE 8-POLE

By adding 2 poles next to magnet, the standard 6-pole relay becomes an 8-pole unit—*the first 8-pole relay available for single deck wiring.*

**No. 5UK-8**
**Basic**
**8-Pole**

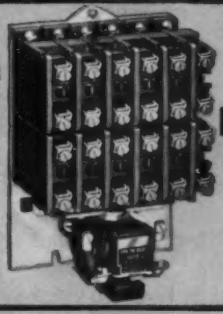


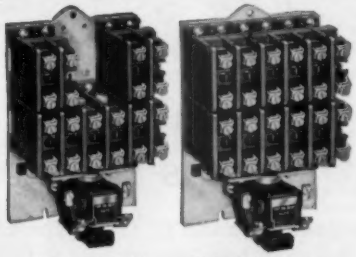


6-POLE Double-decked 8-POLE Double-decked

By removing 2 poles from the double-decked 8-pole relay, you get an alternate 6-pole of double-deck construction.

**No. 5U-12**
**Basic**
**12-Pole**

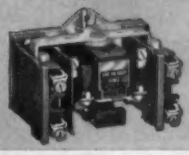




10-POLE 12-POLE

With 2 poles removed, the 12-pole unit becomes the standard 10-pole relay. Both have identical mounting dimensions with NEMA standard size 1 starters.

**No. 5UK-2**
**2-Pole**



2-POLE "SPACE SAVER"—a special purpose relay designed exclusively to meet small or unusual space requirements. Overall height less than 3 inches.

*Write for 8-page illustrated Bulletin PL-7305 for complete information on this revolutionary new line of heavy-duty relays. Or contact your nearest Clark Distributor.*

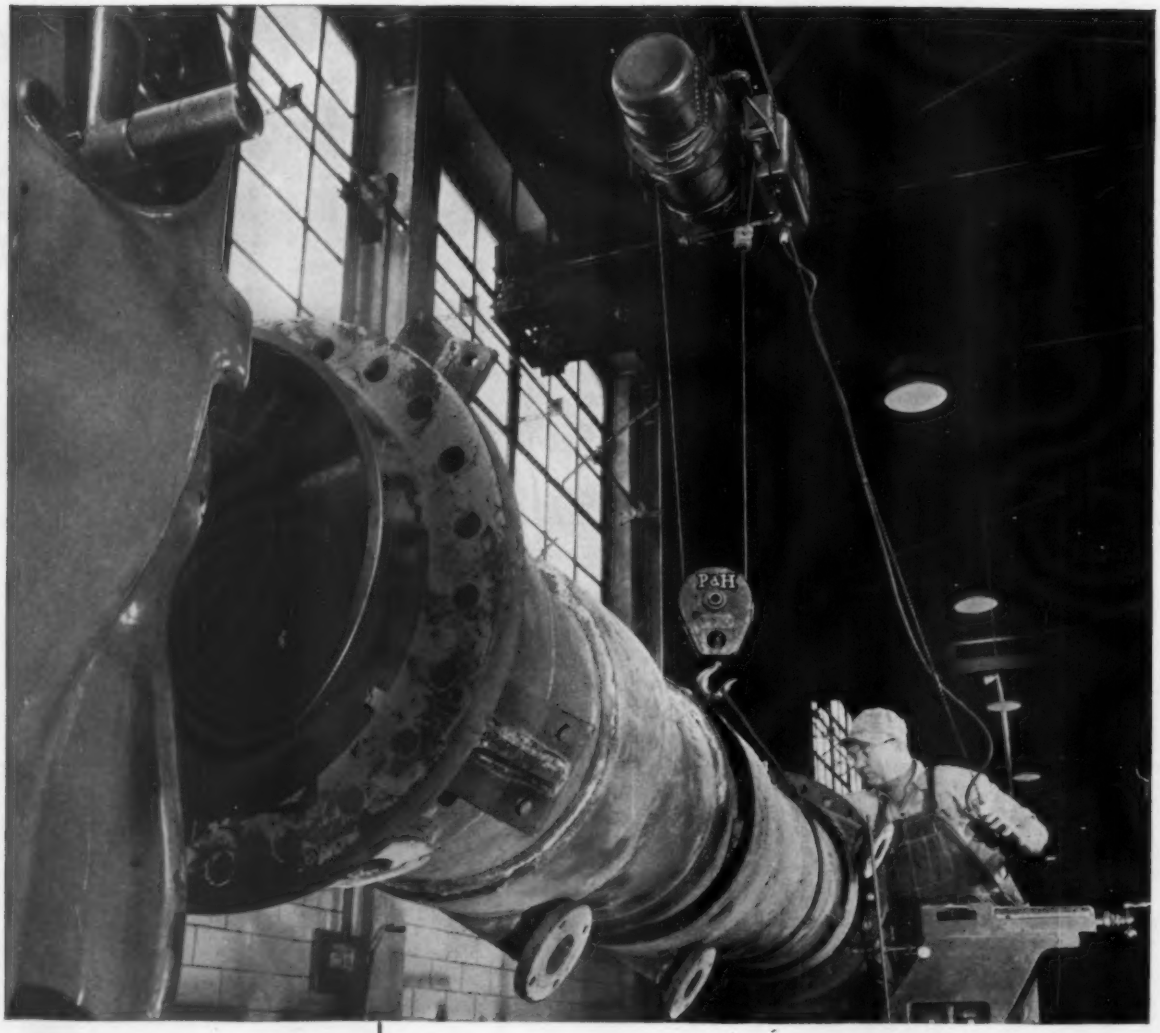
The CLARK CONTROLLER Company

*Everything Under Control*

1146 East 152nd Street • • Cleveland 10, Ohio

IN CANADA: CANADIAN CONTROLLERS, LIMITED • MAIN OFFICES AND PLANT, TORONTO

**For more facts circle 587 on Reply Card**




# Really Cuts Downtime!

## Only P&H HEVI-LIFT HOIST has maintenance-free RCD brake

P&H Hevi-Lift hoists are equipped with the RCD brake — the best brake that has ever been put on an electric hoist. It's a tough "mill-type" brake just like those used on big overhead cranes. It is virtually maintenance free — and eliminates 40% of the total hoist maintenance as a result.

The reason is simple: total brake movement is only 1/32 of an inch. In a P&H RCD brake there's no brake linkage, no laminations, and only *one* simple point of adjustment.

Moreover, the RCD brake (rectified direct current) moves *quicker* for precise inching and accurate spotting. Hevi-Lift ratings range from 1000 to 40,000 lbs. capacity.

Write for "Hevi-Lift Bulletin H-5" to Dept. 210C, Harnischfeger Corp., Milwaukee 46, Wisconsin. And for expert job analysis and engineering assistance on hoist installations contact your local P&H hoist distributor.

**HARNISCHFEGER**

P&H INDUSTRIAL DIVISION
MILWAUKEE 46, WIS.

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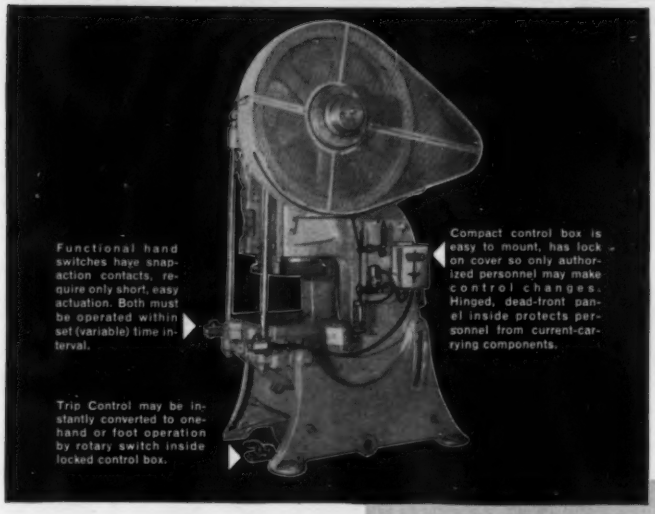
# MICRO SWITCH . . . FIRST IN PRECISION SWITCHING


Functional hand switches have snap-action contacts, require only short, easy actuation. Both must be operated within set (variable) time interval.
Compact control box is easy to mount, has lock on cover so only authorized personnel may make control changes. Hinged, dead-front panel inside protects personnel from current-carrying components.
Trip Control may be instantly converted to one-hand or foot operation by rotary switch inside locked control box.

## MICRO SWITCH TRIP CONTROLS

for more PRODUCTION with increased Safety

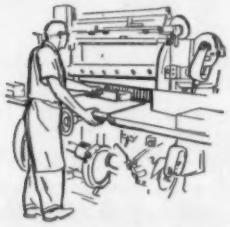
**MICRO SWITCH Trip Controls have wide range of uses**

These controls offer a choice of desirable single stroke control for positive mechanical clutch machines and automatic cycling control for friction clutches and hydraulic and pneumatic equipment.

**FOR SMALL PRESSES**

Provides faster, safer operation with less effort of small two-hand presses, riveting machines, etc.

**FOR PAPER CUTTERS**



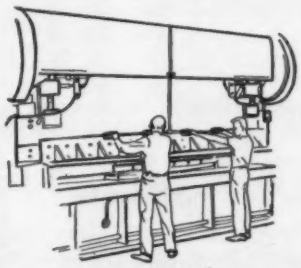
Complete protection is afforded operator in cutting or trimming either flat stock or labels.

**WIDE VARIETY OF PRESS CONTROL METHODS AVAILABLE**

1. One operator—two hands.
2. One operator—two hands or one foot.
3. One operator—two hands or either hand or one foot.
4. Two operators—one to four hands, any combination, or one foot.
5. Three operators—one to six hands, any combination, or one foot.
6. More than six hands, any combination, or one foot.

**INCREASED PRODUCTION with INCREASED SAFETY**

- Instant electrical response
- Feather-touch operation
- Easy control changes
- Decreased operator fatigue
- Two hand operation
- Cannot be "cheated"
- Interlock prevents power stroke while changing dies



**FOR USE ON LARGE PRESSES**

Makes operation of large presses and press brakes safe and less tiring. Any number of operator stations may be "wired into" the control circuit.

*Let us send you complete information on* MICRO SWITCH *Trip Control and the name of the distributor nearest you.*

**SEND FOR CATALOG 65 TODAY**

Gives complete description of all controls and clutch actuating equipment.

**MICRO SWITCH**

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

In Canada, Leaside, Toronto 17, Ontario • FREEPORT, ILLINOIS

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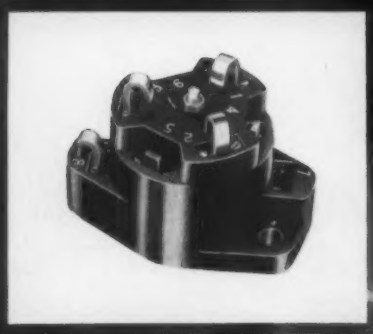

Typical KLIXON Built-In Motor Protector for 3-phase motors.

This is the new UNIFIL — a modern, compact, automatic machine, which, Universal Winding Company says, "makes traditional methods of filling preparation startlingly obsolete."

# UNIVERSAL WINDING COMPANY

## Specifies and Uses KLIXON Protected 3-phase motor in revolutionary new loom winder

In announcing its new UNIFIL® Loom Winder, the Universal Winding Company describes it as "the new concept of filling preparation for the textile industry."

This new machine, which was produced after years of research and development, features a KLIXON protected 3-phase motor.

Universal Winding, like many other manufacturers, now specifies and uses motors with KLIXON Built-In Protectors. They've found that motors which have built-in protection:

- Develop maximum capacity under any overload condition, without danger of burnout.
- Have less production down time.
- Reduce installation costs, repairs, and replacements.

KLIXON protected 3-phase motors are rapidly becoming available in most makes in sizes ranging from fractionals up through 7½ h.p. (600V).

Check with your motor supplier's district office on how to obtain KLIXON protected motors when you place your next order—the additional cost is more than offset by the savings. We'll gladly send literature on request, too—no obligation.

**METALS & CONTROLS CORPORATION**

*Spencer Thermostat Division*

4507 Forest Street, Attleboro, Mass.

KLIXON®

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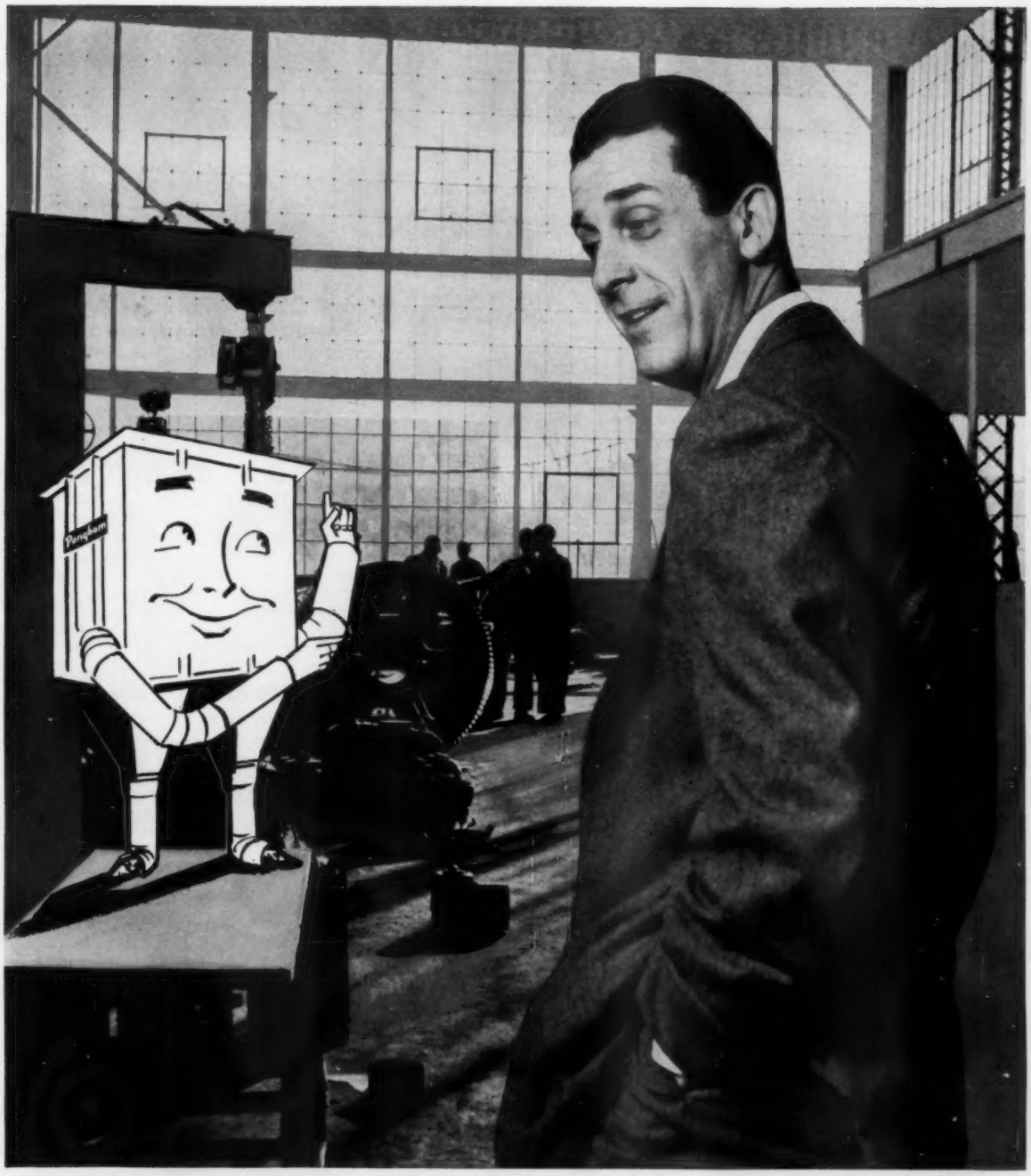



# "You're kidding! Cut housekeeping costs 20%?"

You heard right! Many firms have been getting 20% lower housekeeping costs after installing Pangborn Dust Control in their plants. That's because Pangborn Collectors trap dust controlled at the source . . . won't permit uncontrolled dust to settle on walls, floors, working surfaces. Of course, we can't promise *your* housekeeping costs will drop as much as 20%. But less painting, sweeping, washing can cut your overall maintenance costs 5%, 10%, 15% or even more.

What's more, Pangborn gives you other benefits of longer machinery life, higher employee efficiency, extra profits from any salvage value and better employee and community relations. And Pangborn offers a complete line of dust collectors for all jobs.

Discover how you can profit from Pangborn Dust Control! Write for Bulletin 922 to PANGBORN CORP., 3200 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment.*

**Pangborn CONTROLS DUST**

**For more facts circle 591 on Reply Card**

# NEW PRODUCTS AND PROCESSES

summarized for your convenience

*Edited by M. E. Heniken*

## 1—WIRE, CABLE for wet or dry locations

Heat and moisture resistant, rubber insulated and fibrous covered wire and cable is announced as Type RHH 90 C RHW 75 C. For general use in wet or dry locations, Type RHH-RHW is reported to carry UL listing for 600-v service in Sizes 14 through 6 AWG. The insulation is company's Nepcozone butyl developed for high voltage cable where its ozone and corona resistant properties are desired. This wire is expected to find application where heat, moisture may be present and where rubber insulation characteristics may be preferred. National Electric Products Corp.

## 2—SMALL COMPRESSOR supplies oil-free air

The CACB is a small compressor designed to provide oil-free air for the operation of instrument controls, as well as for use in food processing, brewing, distilling, paint spraying and the manufacture of plastics. The heart of the space-saving compressor is said to be in the carbon parts in the cylinder which require no oil or water lubrication. The single-stage, air-cooled unit is available base or tank mounted. It supplies 4 to 5 cu ft of oil-free air per minute, and is suitable for discharge pressures of 40 to 100 psi. Automatic start and stop controls are supplied as needed. Gardner-Denver Co.

## 3—COATING for resurfacing plastic building panels

Corrucote can be used to resurface old glass fiber reinforced plastic building panels and can be used on new pieces for reduction of light transmission. It comes in five colors in addition to the clear material. Basically an acrylic lacquer, the coating has a drying time of 20 minutes to a tack-free state, and a coverage of approximately 300 sq ft when sprayed. While one coat may be brushed on, it is recommended that spray methods be used to eliminate streaking. Corrulux Div., L-O-F Glass Fibers Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 213-214.

## 4—FEED-IN DUCT, aluminum, is totally enclosed

This line of totally enclosed aluminum feed-in duct is UL approved and does not require derating, manufacturer announces. Standard construction of the

busways is designed to meet NEC article 3644 providing that "busways may extend vertically through dry floors if totally enclosed." The totally enclosed feature is accomplished by separating and enclosing the aluminum bus bars in solid sheets of insulating material. This not only reduces the cross section, says company, but also results in low voltage drop and high short circuit strength equal to or exceeding NEMA standards.

Telescoping joints that permit infinite adjustability up to 12 in. are used to eliminate need for odd lengths. By using standard 3-, 5-, 7- and 10-ft straight lengths with one or two telescoping joints, you can obtain dimension needed without special fittings. Elbows, tees, crosses, offsets and switchboard stubs are adjustable through 6-in. Square D Co.

## 5—PINTLE-TYPE CHAIN for woven wire belts

Developed expressly for use on woven wire belts, this pintle-type chain is suggested for belt installations where a chain drive is required to move heavy loads or to assure positive motion, such as through heat treating cycles or during inclined movement. Similar to standard pintle chains, it incorporates numerous improvements including a heavier shoulder that provides equal bearing surfaces at both open and closed ends of the link. Distribution of bearing stresses is thus equalized, company states, and longer chain life may be expected.

Also contributing to longer chain life is the free-floating, rather than fixed, connecting pin, which permits wear to occur around the full 360-deg circumference of the pin rather than only at localized areas. Pin diameter is increased to permit carrying of heavier loads and facilitate assembly and disassembly. It is pointed out that because of the symetrical design of the new link, the assembled chain works on standard sprockets. The Cambridge Wire Cloth Co.

## 6—LIQUID DETERGENT for steam cleaning operations

LSD is announced as a liquid detergent for use in solution lifting steam guns and self generating steam cleaning equipment. Developed to simplify preparation of steam cleaning solution and reduce clogging of coils in self-generating equipment, it will handle a variety of steam cleaning operations from light to medium-heavy duty. LSD is said to provide effective soil removal at concentrations of 1 to 2 oz to each gallon of water as delivered by the gun. Used as recommended it is claimed to be safe on steel, brass, and magnesium, to have no effect on painted surfaces. Its solutions have a pH of 12 in the operating range. Oakite Products, Inc.

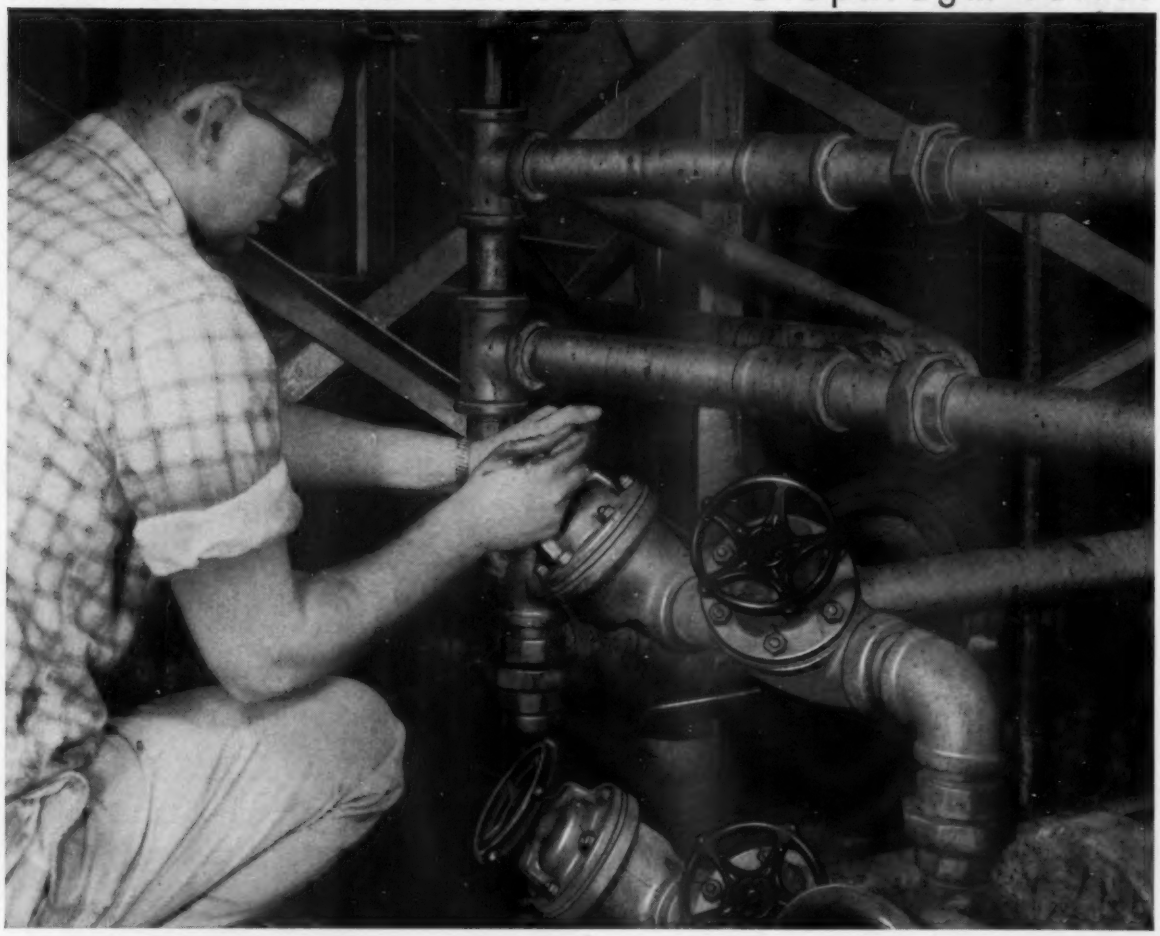
## 7—SHIPPING BOX offers cost advantages

This container is reported to provide competitive or lower first cost with savings of 80 per cent in assembly or disassembly (either done in a minute or two by unskilled help), greater structural strength while using fewer structure members, lighter tare weight due to less material used, perfect 45-deg diagonal

bracing on corners as a built-in standard feature, use of less steel strapping, and full advertising value as a "traveling billboard" with its smooth side panels. In addition, says manufacturer, this container uses no nails in assembly, can be shipped and stored knocked down, has interchangeable parts—you can make different size containers with fewer panels—and can be built with a pallet base as an integral part of the container.

The containers are assembled, locked and braced in one easy operation that requires no special tools—only the insertion of a tubular metal spindle in the 45-deg slots designed into eight corners of

Another satisfied user of Crane Diaphragm valves



# Best by test for this heavy, sticky emulsion —Crane diaphragm valves

What valve is best and lasts longest in this service? A West Coast emulsified asphalt producer tried them all on the manifold above and here's what was found.

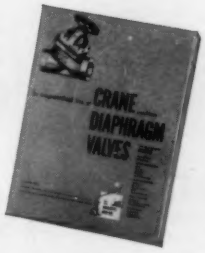
Conventional valves would become inoperative in a short time. The main trouble was binding of the stem in contact with the cold, heavy asphalt emulsion.

Ordinary diaphragm valves on the same service lasted only two months and had to be replaced. The diaphragms didn't stand up and the high torque required for closure was impractical for frequent operation.

Three years ago the plant started using Crane No. 1610 Packless Diaphragm Valves. The neoprene diaphragm functions only to seal the bonnet. It is not subject to crushing and excessive wear as a seating member. The separate disc in combination with Crane Y-pattern body makes positive closure with minimum torque and turns. These valves are giving full satisfaction.

**Literature on Request**

Wide choice of body and diaphragm materials makes these exclusive Crane valves particularly useful to process industries. Ask your Crane Representative for Circular AD-1942, or write to address below.




# CRANE VALVES & FITTINGS

**PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING**

*Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas*

**For more facts circle 592 on Reply Card**

# NEW PRODUCTS

(Begins on Page 170)

each container. The containers can be made of any panel material ordinarily used. Any panels damaged or worn can be replaced at a fraction of the cost of a container. Evans Container Corp.

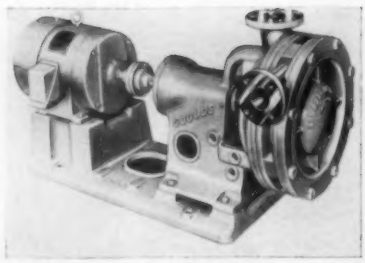
## 8—VAPOR DEGREASER supplied as complete unit

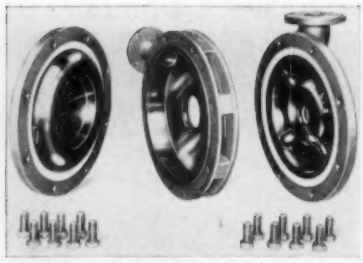
There are no extras to buy on the improved Aircon Model 75 Vapor Degreaser. This economical unit is supplied with low level thermostat control and water flow interlock to prevent boilout due to water supply failure. The unit is electrically fired on 220 or 440 v and electrical heater load is controlled by heavy duty magnetic contactors. A working area of 38 by 22 in. and vapor depth of 24 in. allows a load cleaning capacity from 600 to 900 lb of steel per hour. It is suitable for trichlorethlyene solvents — requires 16 gal boiling sump, 24 gal in storage. A self-solvent-distilling feature assures fresh solvent for spraying. Water consumption is 30 gph. Construction is heavy gage steel with a rust inhibitive interior coating. The unit is furnished with ¼-hp motor, centrifugal pump, and a manual spray lance. Aircon Div., Armstrong & White, Inc.

## 9—FLOOR SWEEPER can tow truck loads, too

The Hydra-Sweep, a power floor sweeper, can also be used as a tow truck for intraplant loads or personnel. It is reported capable of towing a wheeled load up to 7 tons at 7 mph. According to manufacturer, this sweeper will save enough to pay for itself in a year in

plants having as little as 20,000 sq ft of sweepable floor space; if given additional duty as a tow truck, even greater savings are possible. The unit is designed to sweep 150,000 sq ft of floor space in an hour. The Hydra-Sweep is equipped with hydraulic drive (no gears or clutch), which is said to eliminate danger from overload, even when the sweeper is used as a tow truck. If load is too heavy to move, a relief valve opens and the hydraulic fluid by-passes the driving mechanism, company explains. Other features include a covered and protected dust filter system, and a single foot pedal which serves and as forward and reverse throttle and brake. Industrial Sweeper Co.





## 10—GLASSED CENTRIFUGAL PUMP for handling corrosives

Specifically designed for efficient pumping of corrosives, this glassed centrifugal pump, the Figure 3708 is the result of cooperative effort by Goulds Pumps, Inc. and The Pfaudler Co. To permit glassing the insides of the pump chamber and associated parts, a special three-piece construction was developed, in which casing, suction piece and casing cover are separate glassed parts (illustrated) which fit together to make a corrosion-resistant pumping unit.

Inner surfaces of the iron pump are glassed, so that the liquid being pumped doesn't come in contact with metal. Thus, it is noted, the full corrosion resistance of the Pfaudler glass to all organic acids (except hydrofluoric) and alkalis to pH-12 at 212 F is utilized. This means, according to manufacturers, that you can switch from one product to another without concern about the corrosion resistance of this pump. This glassed metal pump is reported to offer some outstanding hydraulic advantages, including improved flow qualities. Glass eliminates adherence of product being pumped to the interior of the pump, it is pointed out ..many polymers will cling to metal surfaces but will not stick to glass. It also facilitates cleaning operations. Being inert, glass exerts no catalytic effect, and will not enter side reactions which could contaminate products. Surprising structural strength is also attributed to the glassed metal.

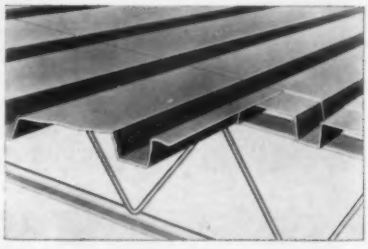
Flexibility in installation is a major design advantage offered by this pump. Suction can be placed in either a top vertical position or 90 deg either side of vertical, and the discharge outlet can be placed in four different positions. Increased versatility also results from the use of either a mechanical seal or a stuffing box. The stuffing box is on the suction side of the impeller where it is subject only to the suction head or pressure under which the pump operates. The pump comes in four sizes and capacities up to 700 gpm, heads to 140 ft. Goulds Pumps, Inc.

## 11—SPRAY PAINT is quick drying white coating

Tropical Spray Mill White is announced as a quick-drying interior spray paint that eliminates overspray. The flat white coating dries so rapidly, it is said, that overspray or fog dries in the air and falls harmlessly to floor, where dry granules can easily be swept away. Paint is described as excellent in hiding ability, making it possible to cover most old painted surfaces or newly primed surfaces in one coat. A synthetic alkyd, it is reported durable on interior wood, metal, wallboard, plaster and concrete surfaces. Tropical Paint Co.

## 12—FLOW CONTROL regulates controlled backwash

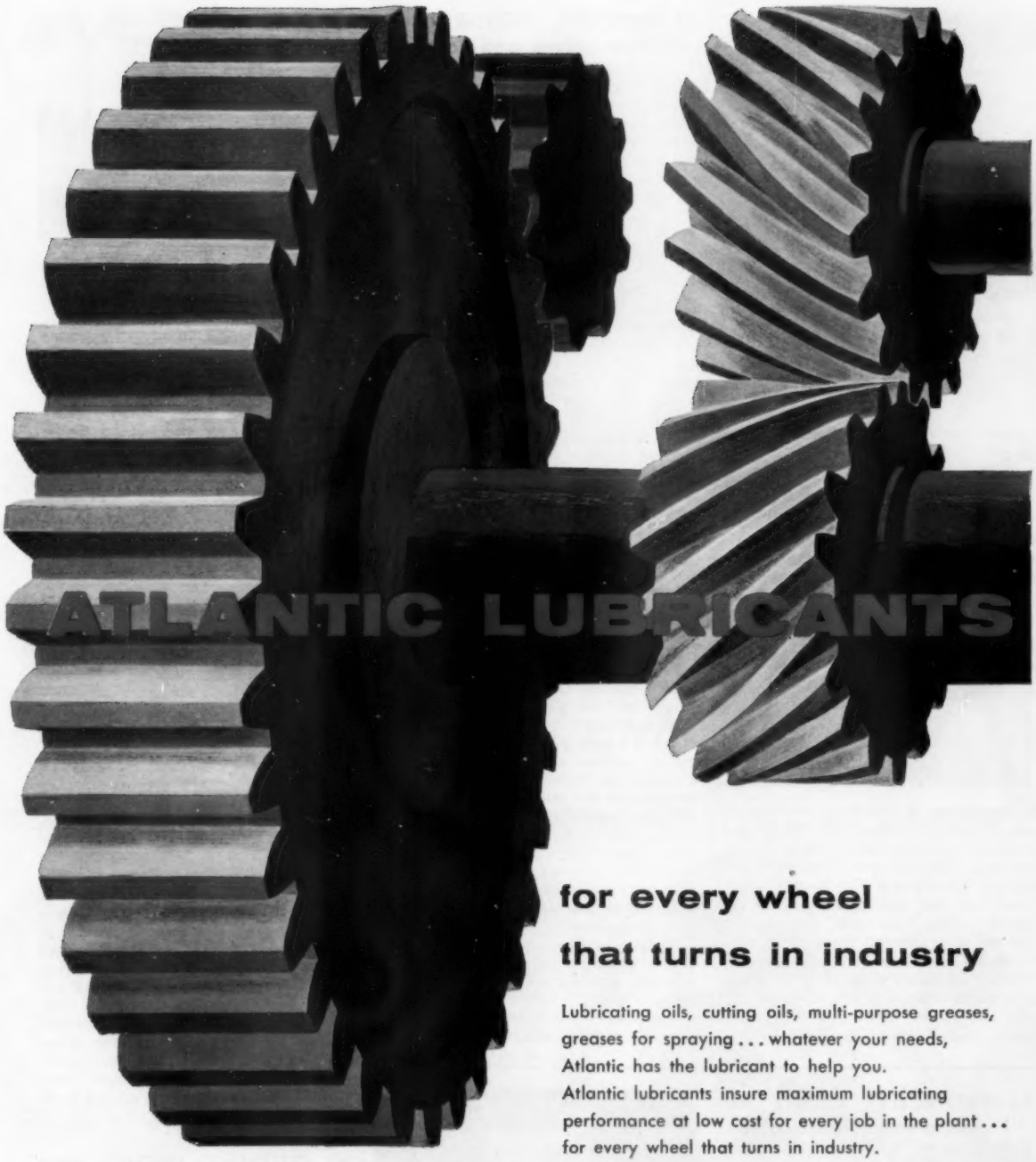
Designed for use in equipment requiring a back flushing operation, this ¾-in. size component, when connected into the line, permits a controlled flow rate in one direction; uncontrolled flow rate with minimum pressure drop in the other direction. While the Flush-Flo Control may have a variety of uses, it was designed primarily for water softening equipment to regulate a controlled backwash or brine rinse flow in a regeneration cycle. It permits unrestrained flow of soft water when softener is in normal operation. Unit is available in a variety of controlled flow rates to 8 gpm; parts are of bronze and Neoprene and nylon. Folder 237 gives details. Hays Mfg. Co.



## 13—ROOF DECKING is designed for fast erection

To help get construction "under roof" in the shortest time possible, this company announces availability of its lightweight steel roof decking, Ferrobord, in 24-in. widths. Roll formed from 18-, 20- and 22 gage cold rolled steel strip, copper bearing steels or tight coated galvanized steel, the roof deck comes in units 1½-in. deep, up to 32½ ft long. Straight lay is used, to enable several crews to lay deck simultaneously. Ease and speed of erection are further aided since the 24-in. Ferrobord is electric arc welded directly to the steel purlins. Adjacent sheets are joined by interlocking and fastened by button punching to assure maximum transfer of loads.

The light weight of the deck, company points out, means that smaller supporting members can be used; thus the amount of steel needed in a structure is less than if a heavier type of roof slab is used. Ferrobord may be insulated for reduction of




## for every wheel that turns in industry

Lubricating oils, cutting oils, multi-purpose greases, greases for spraying . . . whatever your needs, Atlantic has the lubricant to help you. Atlantic lubricants insure maximum lubricating performance at low cost for every job in the plant . . . for every wheel that turns in industry.

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**PROCESS PRODUCTS**

**For more facts circle 593 on Reply Card**

# NEW PRODUCTS

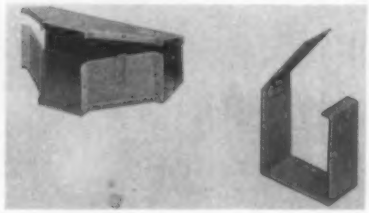
(Begins on page 170)

heat transmission and elimination of condensation. One end of the 24-in. Ferrobord has a 3-in. depression to provide a telescoping action when lapped, resulting in a continuous unbroken surface. Truscon Steel Div., Republic Steel Corp.

**Use the Reader Service Cards provided on pages 213-214 to ask for more information on these products. Circle item numbers of products in which you are interested.**

## 14—ELECTRICAL WIREWAY is flangeless, "lay in" type

Wire can be assembled and laid in after the wireway is installed, with Boss Lay-In Electrical Wireway and Fittings. The line of flangeless hinged-cover equipment



is designed to eliminate wire pulling and risk of damaging insulation. Three sizes of wireway are available: 2½-by-2½ in., 4-by-4 in., and 6-by-6 in. Lengths of 1, 2 and 5 ft are included. The flangeless units have firm, but easy knockouts and full length covers, it is noted, and sections can be easily clamped together by a U-connector or can be attached to flanged wireway by means of an adapter. Accessory fittings offered include U-connectors, 45- and 90-deg elbows, T-fitting pull boxes, closing plates. The Huenefeld Co.

## 15—PROTECTIVE CLOTH permits work in hot areas

Personal safety in areas where temperatures exceed 2500 F is claimed possible with protective suits made of Kamklad, an aluminized asbestos cloth designed to reflect over 90 per cent of the radiant heat to which it is exposed. The photo shows a man wearing a Kamklad suit, standing before an open door of an open hearth furnace (operating at 2900 F) and plying an oxygen lance into the heat. This cloth can also be exposed to direct flame without damage, says company. It is tightly woven asbestos cloth surfaced with heat reflective aluminum foil which also resists water and oils. Flying sparks and cinders fall right off, it is noted. Kamklad is also suggested for use in fire protective curtains in welding booths,

kilns and other high heat areas, and as fire baffles in plant and garage areas. Keasbey & Mattison Co.

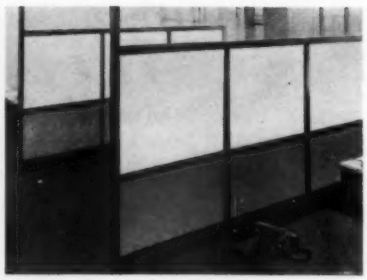
## 16—CONTROL MOTOR operates valves and dampers

The Actionator is an electric motor designed to operate rotary, slipstem and butterfly valves, dampers and other final elements in automatic control systems. A reversing capacitor type, this motor comes in two models, one for two-position and floating control, the other for proportioning control. Units are compact, about 6 in. in diam and 10 in. wide, and they weigh 11 lb. They incorporate a gear train that permits a selection of timings from 7.5 to 120 sec., depending on model.

To prevent "coasting" in any of the positions, units have a built-in internal brake designed to hold a dead-weight load up to 200 lb. Limit switches, which can be adjusted in the field, vary the travel. Enclosed compartments can accommodate up to 16 terminals. These facilitate retransmissions, operation of a second motor or the remote indication of control element positions. The motors are designed to operate under temperature conditions from 25 to 150 F. Electrical ratings are 115 or 208 v at 60 cycles, and 230 v at 50 or 60 cycles. Minneapolis-Honeywell Regulator Co.

## 17—HIGH BUILD VINYL requires fewer coats

Savings up to 47 per cent material and labor are claimed for Amercoat 33HB, a vinyl coating for lasting, low coat protection against corrosion. A high build version of Amercoat 33, in use since 1943, it is formulated with specially matched resins and pigments to permit high solids content without excessive visicosity. As a result, says manufacturer, a gallon will produce 464 mil square feet of protective coating over steel or concrete. When applied at 250 sq. ft. per gallon over a suitable primer, only two coats of Amercoat 33HB are required to exceed the customary safe film thickness of 5 mils, it is stated. The new coating is applied by conventional or hot spray without need for thinning. The dry film adheres, resists abrasion and is non-flammable, odorless, tasteless and non-toxic, manufacturer says; it won't harbor bacteria or fungi and is easily decontaminated and cleaned by detergents. Amercoat Corp.



## 18—SAFETY GLASS in color, for office partitions

Safety glass in rich colors, recently developed in Europe is being introduced here as a decorative, practical panel material for office partitions. Called Colorspan, this material is claimed shatterproof and, like automotive safety glass, to meet safety specifications. Colors are obtained by lamination of colorfast pigmented vinyl between two sheets of window glass. This produces two identically usable sides one each panel. Colorspan comes in 12 decorator colors (ten opaque, two translucent) and can be supplied to meet custom color specification. It is offered in stock sheet glass sizes or supplied cut to size at no extra cost. This glass never needs refinishing, according to company, and it is less expensive than colored tempered glass. It is reported comparable in price with most safety glass and other common partition materials. Mondial United Corp.

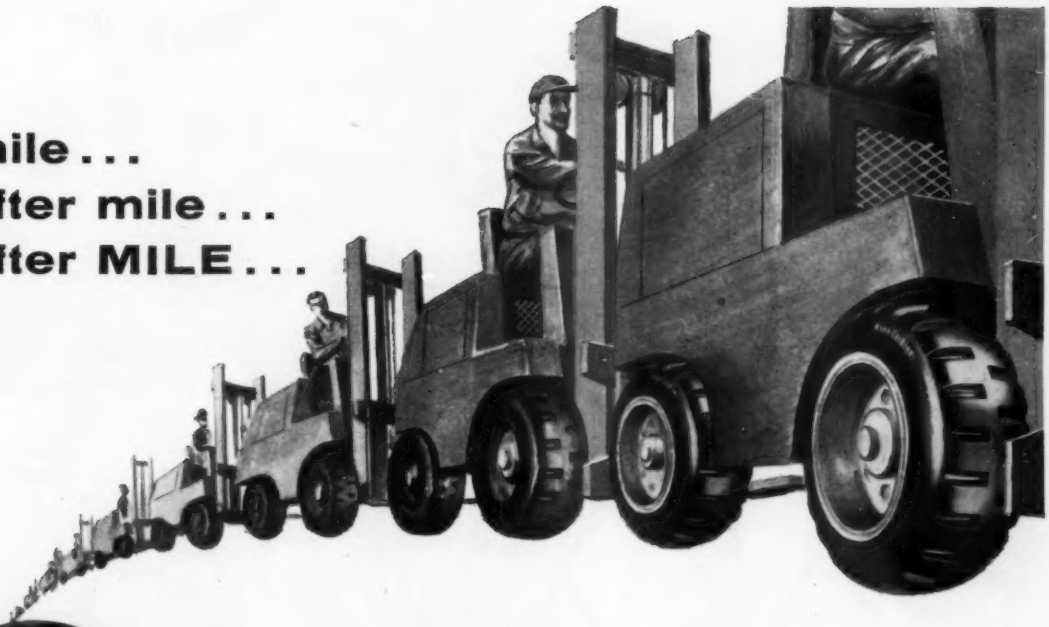
## 19—TRACING PAPER has non-reproducible lines

Grid X is the name of a tracing paper and cloth printed with non-reproducibe lavender cross-section guide lines. By serving as guides, these lines speed and improve hand lettering, ruling, measuring and scaling on original drawings. Prints made from Grid-X originals show only the actual lines drawn by the draftsman, it is stated. Grid-X is available in two forms: printed on transparentized rag tracing paper suitable for both pencil and ink, and printed on water-repellent tracing cloth. The cloth, which comes in roll form, is impervious to perspiration stains, says manufacturer, and can be cleaned with common solvents. The paper comes in sheets, pads and rolls. A sample is offered. Charles Bruning Co., Inc.

## 20—STITCHING METHOD uses continuous wire

In Circuate Wire Stitching, the stitches are cut and formed from a continuous coil of wire, driven into both outer and inner flaps of fiberboard boxes and clinched inside the inner flap without any mechanism entering the box. It is pointed out that this method eliminates the need for retractable clinching anvils, increasing production speed while reducing chances of product damage. According to manufacturer, this method is adaptable for simultaneously closing tops and bottoms of filled boxes (regular slotted or overlapping flaps), the sides and ends

mile...
after mile...
after MILE...



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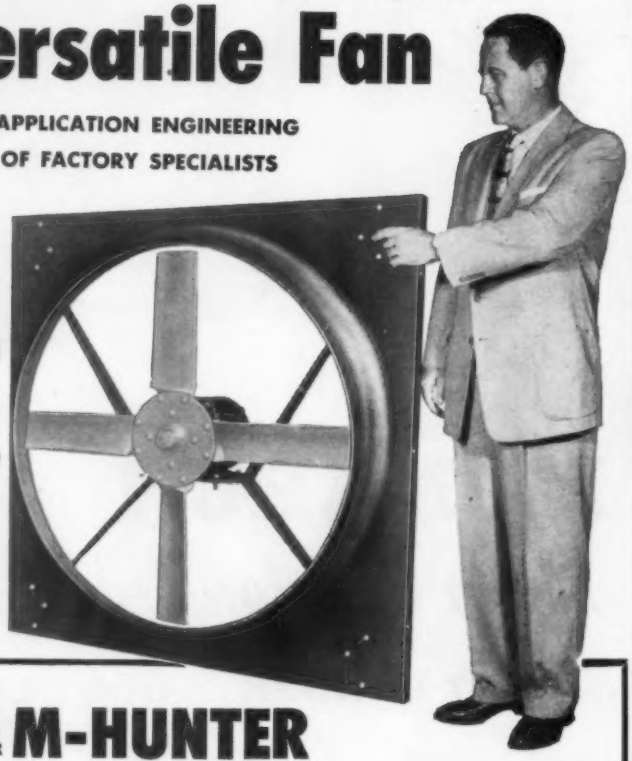
# Rugged Versatile Fan

**BACKED BY APPLICATION ENGINEERING ASSISTANCE OF FACTORY SPECIALISTS**

5400 to 36000 CFM *(Certified)*

24" to 48" BLADES



## R&M-HUNTER Direct-Drive Industrial Fan

**FOR SIDEWALL · PENTHOUSE · SPOT COOLING INSTALLATIONS**

**QUALITY FEATURES . . . QUALITY PERFORMANCE**

- Powerful — effective up to ½" static pressure
- Streamlined air inlet 15% to 18% more efficient
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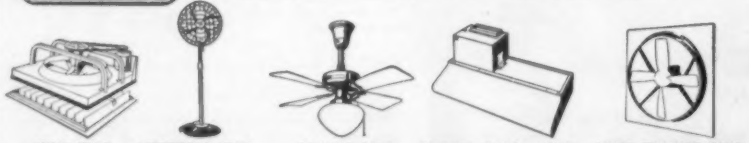

ATTIC FANS · AIRSPREAD FANS · CEILING FANS · KITCHEN RANGE HOOD · QUIET EXHAUST FANS

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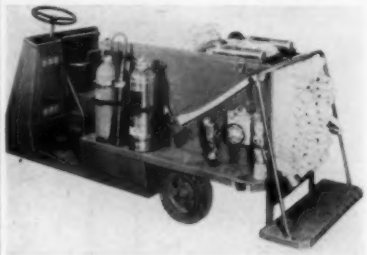
# NEW PRODUCTS

(Begins on Page 170)

of filled five panel folders, and two-piece telescope-type boxes as well as sides, ends, tops and bottoms of outsize containers. Heart of the method consists of company's new N6 series of box stitching machines with specially designed formers, shoes and wire arcing mechanisms which make the self-clinched stitches possible. Acme Steel Co.

## 21—FIRE TRUCK is compact, highly maneuverable

The Dyna-Powered Fire Truck is a three-wheel, electric-powered unit that can carry four or five men and an assortment of fire-fighting equipment, manufacturer announces, yet can travel up to

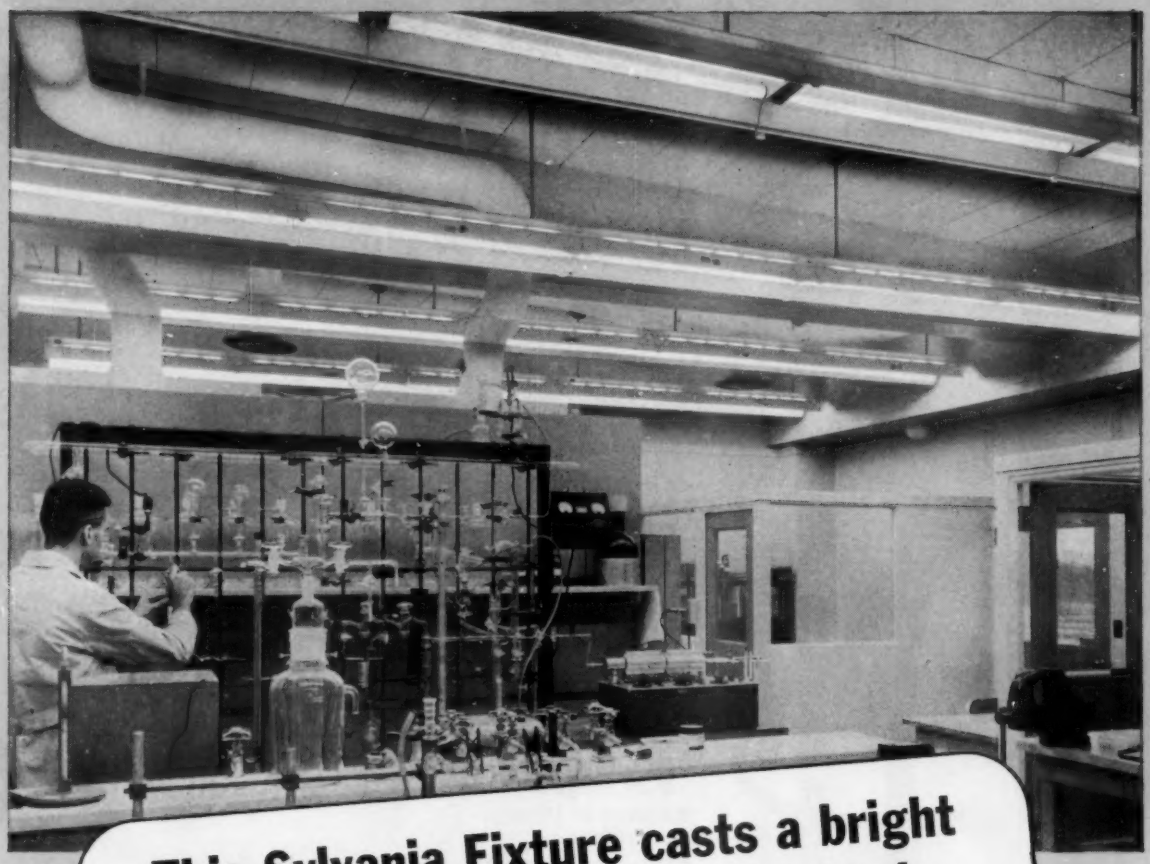


10 mph fully loaded and can make 90-deg turns in a 7-ft plant aisle. Only 108 in. long overall, its compactness and maneuverability let it reach fire sites inaccessible to many trucks. It is powered by batteries which feed a 24-v direct-drive motor, and it has a built-in charger. Automatic lights and siren go on when the stand-up driver steps on the safety treadle, says manufacturer; the brake sets and power is cut off automatically as soon as the driver steps off his position. Besides its passengers, this truck can carry 200 ft or more of hose, three nozzles, six to eight large extinguishers, two to six small ones, asbestos gloves and blankets, axes, flashlights and helmets. Electri-Car Div., Victor Adding Machine Co.

## 22—MOISTURE FINDER has broad application

An advanced electronic system for measuring and recording moisture content in a wide range of industrial products is offered in the Sentry Custom Continuous Moisture Detector. It presents a unitized system with primary circuits contained in lightweight replaceable type drawers. Power is automatically regulated for alternating and direct current and the system is claimed unaffected by wide variations in line frequency or voltage. Moisture selectivity curves range from zero to 30 per cent and moisture classification of moving material is governed by a single control.

Manufacture points out that moisture detection systems are widely used for measuring and recording moisture content of moving veneer and lumber, and that this new custom model is also appli-



# This Sylvania Fixture casts a bright new light on scientific research ... for this large industrial manufacturer

**Upward light component** on Sylvania NTWS fixtures means more and better light on the job. Reflector slots also induce lamp-cleaning upward "chimney" draft.

For over half a year, Sylvania NTWS industrial lighting fixtures have been on the job at the new physics research laboratories of one of the country's largest industrial firms.

These semi-direct lighting units maintain the high 70-80 footcandle levels needed for critical seeing tasks, in studying the electrons which surround the atomic nucleus, in developing a long list of new products based on these studies.

Spearheading new trends in industrial lighting, Sylvania NTWS fixtures deliver a full 10% upward light component through slots in reflectors. This increases illumination efficiency and total light output. *It mellows harsh overhead contrasts ... softens eye-straining shadow and glare spots at working level.*

"The Sylvania fixtures were selected because they met specifications set forth by our General Engineering Department, at a realistic price," reports an engineering representative from these laboratories. "In 8 months of use, there has been no drop in efficiency, no repairs have been required, and lamp replacement is rapid and easy."

For expert lighting assistance, contact the Sylvania Fixture Specialist in your area. And write direct for our *free* new helpful booklet No. V-501, "*Prescribed Lighting Protects the Eyes of Industry.*"

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# CM Lodestar®

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FLEXIBLE
LINK CHAIN

PUSH-BUTTON
CONTROL

FEATURING:

- Push Button Control
- Ultra-Modern Regenerative Electric Braking
- Self-Adjusting Heavy Duty Magnetic Brake
- Sealed-in Lifetime Lubrication
- Overload Protection
- Fully Enclosed Components
- Lowest Headroom
- "CM-Alloy" Flexible Link Chain

CAPACITIES: from ⅛ to 1 ton. Single and 3 phase. ¼ ton model weighs only 51 pounds.

$149.50 and up
F.O.B. Factory

Built to serve you without costly maintenance

Lodestar is the first truly "heavy duty" version of the small electric hoist. The CM Lodestar is designed to operate without costly maintenance or interruptions in your work schedules. The initial cost is practically your only cost with a Lodestar... an extremely low cost indeed!

WRITE US or call your CM distributor for literature, prices and quick delivery from stock.

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CM HOISTS AND CHAIN

For more facts circle 597 on Reply Card


# NEW PRODUCTS

(Begins on page 170)

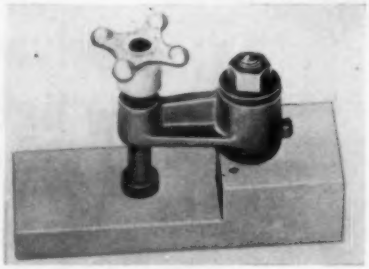
cable to products such as cereals, wall board, textiles, handled on moving conveyors. Through the compact, plug-in drawer arrangement, the entire system may be readily serviced or expanded. Laucks Laboratories, Inc.

## 23—SELF-PRIMING PUMP has Neoprene impeller

The K½ Special is self-priming and operates quietly and effectively in either direction at low or high speeds, manufacturer announces. It is believed to be the first Neoprene impeller model in ½ in. IPS designed to operate off a motor as small as 1/3 hp single phase. Made of Naval bronze, with a stainless steel shaft, it handles liquids that do not affect bronze or Neoprene at 7½ gmp, 10 psi at 1750 rpm. The small initial cost of this pump (less than $17.) together with the fact that it can utilize a low-priced, low-operating cost motor, makes it an economical unit for low pressure use of not more than 10 psi. Only moving part is the impeller—replaceable at low cost. American Machine Products, Inc.

## 24—CLAMP ASSEMBLY uses detachable spring lock

This revolving clamp assembly incorporates a detachable, spring lock revolving shoe on a knob screw for positive work



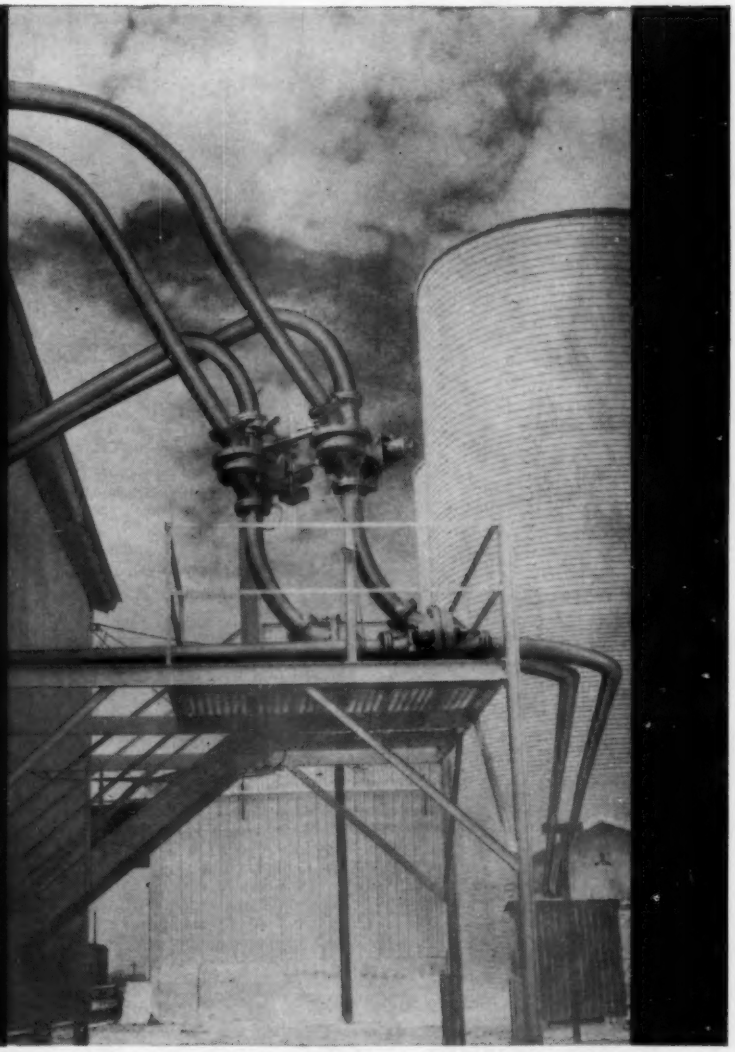
holding on uneven clamp down. Used for holding down work to be drilled or milled, manufacturer says this clamp assembly will operate with either left or right hand swing by optional location of stock to be worked. The clamp assembly is made of malleable casting and is designed to quickly swing clear of work and fixtures. Available in 1⅛-3, and 4-in. sizes, each clamp assembly can be applied by drilling and tapping one hole. Jergens Tool Specialty Co.

## 25—TISSUE THIN GLOVE resistant to corrosives

Made of vinyl Pylox (TM), Nimble Fingers are designed for jobs requiring extreme finger sensitivity. These gloves have high non-allergenic properties making them suited for most persons allergic to rubber gloves. And although thinner than a surgeon's glove, they are claimed resistant to deterioration corro-

Minerals & Chemicals Corporation of America found...

# It pays to specify Alcoa Aluminum Pipe to lick corrosion, prevent product contamination



When resistance to corrosion and freedom from product contamination are important, aluminum pipe is the low cost answer. Here's a case in point:

The McIntyre, Georgia, plant of Minerals & Chemicals Corporation processes Kaolin clays. Pipe originally used in corrosive stages of their process failed in as little as six months. In 1954, they specified ALCOA® Aluminum Pipe to replace it.

The natural corrosion resistance of aluminum has kept it in constant service without the heavy maintenance and replacement expense experienced before. Costly production shutdowns for pipe replacement have been eliminated. Moreover, the aluminum pipe has insured delivery of a pure, iron-free product . . . while the pipe's smooth, clean surface keeps friction loss at a minimum for low pumping costs.

Minerals & Chemicals' engineers sum up their experience this way: "Our original ALCOA Aluminum Pipe proved that it pays to specify aluminum when corrosion is a threat. Now we're using more aluminum pipe as well as aluminum siding and roofing for many of our buildings and conveying systems."

If *you* are troubled by corrosion or product contamination, it will pay you to investigate aluminum today. The convenient coupon will get complete information to you immediately.

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# AIR IN MOTION KEEPS MEN IN MOTION

Dusty or fume-laden air can curtail production and increase maintenance costs by dulling worker efficiency and damaging bearings, motors . . . even machines.

Efficient K & B Dust Control Systems put AIR in Motion to become an important production tool.

In the plant of a noted chain and forging firm, an official made this comment about a new K & B installation: "Our workmen can now work full time . . . this means added production for them and for the company as well."

Call on K & B engineers to put *AIR in Motion* and help boost your plant efficiency. The Kirk & Blum Manufacturing Company, 3189 Forrer Street, Cincinnati 9, Ohio

K & B system serving castings grinding removes dust, sand and chips as fast as they are produced. Work revolves on turntable to enable operator to work continuously.

50 YEARS OF SERVICE

KIRK & BLUM

DUST CONTROL

K & B Down Draft Dust Control System in plant of The Monarch Machine Tool Co., Sidney, Ohio

For more facts circle 599 on Reply Card


# NEW PRODUCTS

(Begins on page 170)

sive substances and comfortable to wear. Manufacturer says Nimble Fingers can be worn in comfort all day long, because of their textured inside finish. And they can be turned inside out and worn reversed for jobs requiring a non-slip grip. These gloves are announced as resistant to normal acids, alkalis, oils, greases and some solvents, and are suggested for jobs where products being handled have to be protected from bacteria or perspiration. Pioneer Rubber Co.

## 26—TROLLEY HOISTS, hand geared and push type

Two new lines of this company's lightweight Budgit Army Type Trolley Hoists are announced. One line is hand geared and includes 1 to 10-ton models. The other features push-type units from ¼ through 10 tons. A feature of the new design, declared the first in its capacity range, is adaptability to a wide range of I-beam sizes by simply rearranging spacer washers on the cross shafts. All models are designed to combine the high-lift advantage of low headroom requirements with lightness and ruggedness. This is accomplished by modifying the center frames for permanent attachment to specially designed trolleys. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

## 27—COATINGS stick to galvanized, other surfaces

Specially formulated to be applied over brand new, unpainted galvanized, aluminum or terne plate surfaces, Galvinoleum Coatings come in red, gray, green and metallic colors. Galovinoleum is claimed to "take hold," to last and last and not peel off. Etching of the galvanized surface is not required. Any high quality oil base house paint may be used over Galvinoleum, it is noted. Form 256 gives details. Rust-Oleum Corp.

## 28—STEAM TRAP can be installed outdoors

Industrial thermostatic steam traps in the Quik-Flex line are designed to meet weather conditions encountered in outdoor industrial steam processing .. as in tracer line, meter box and other applications .. as well as many indoor uses. Manufacturer says these traps are freeze-proof. Construction features emphasized include an Anderloy alloy valve and seat with high corrosion and scoring resistance, a cap of forged steam bronze or cast semisteel, heavy duty cast steam bronze or semi-steel body. The removable cap

## these are the manufacturers who offer RLM-labeled units...

LOOK FOR MANUFACTURER'S NAME HERE
RLM
COMPLIANCE WITH RLM STANDARDS
ELECTRICAL TESTING LABORATORIES, INC.
INCANDESCENT RLM SPECIFICATIONS
FLUORESCENT RLM SPECIFICATIONS
ABOLITE LIGHTING DIV.
APPLETON ELECTRIC CO.
BENJAMIN ELECTRIC MFG. CO.
DAY-BRITE LIGHTING, INC.
EASTERN FIXTURE CO., INC.
ELECTRO SILV-A-KING CORP.
ENDER-MONARCH CORP.
FLUORESCENT FIXTURES OF CALIFORNIA
GLOBE LIGHTING PRODUCTS, INC.
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SUNBEAM LIGHTING CO.
SYLVANIA ELECTRIC PRODUCTS, INC.
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WHEELER REFLECTOR CO.
WORK-O-LITE CO.
*Aluminum Reflectors all others are Porcelain Enamel
Note: Many manufacturers make incandescent RLM Units for more than one lamp size. The numerals refer to the number of different-size RLM Units which the manufacturer offers under the specification.
D-1, 2, 3 — 8—15% uplight
SD-1 — 20-30% uplight
O = Open End
C = Closed End

# 1000 Words of Specifications

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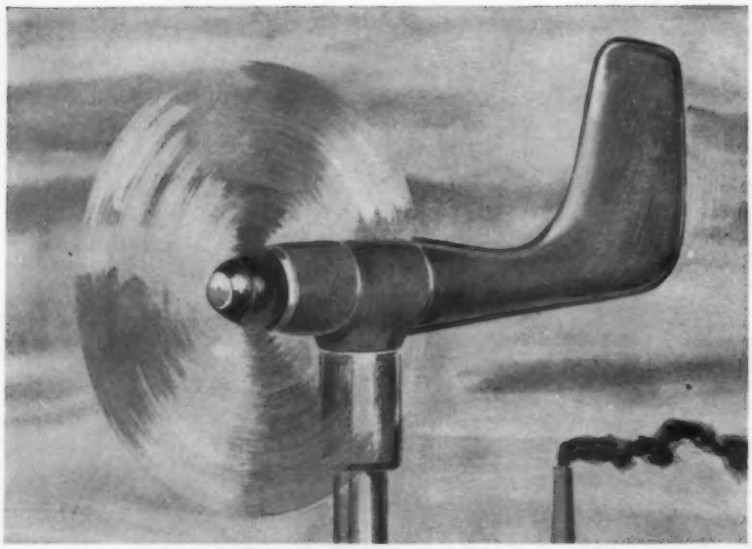


*The Aerovane Transmitter detects wind speed and direction, electrically transmits data to indicator and recorder, and actuates control mechanism.*

# BENDIX AEROVANE* SYSTEM HELPS SOLVE AIR POLLUTION PROBLEMS

*Indicator shows wind speed and direction. Calibrated in compass degrees and miles per hour.*

*Recorder inks wind speed and direction on time-calibrated chart. At normal setting, operates continuously for two-week period.*

*Optional indicator-controller reduces operating cost of blowers, deodorizers and scrubbers by providing automatic on-off control.*

Here's how you can relieve air pollution problems in connection with your plant—and, incidentally, save your company endless headaches. The Bendix-Friez Aerovane System can be of tremendous value to you in eliminating costly and bothersome litigation, saving you money and building good public relations in the community where your plant is located.

If your stacks emit an odorous or possibly dangerous effluent, you must take steps to prevent it from harming personal health, crops or residences in the surrounding area. Bendix-Friez Aerovane System can help do the job as economically as possible.

Here's how it works. When winds are from an unfavorable quadrant, and blowing at velocities which indicate the likelihood of injurious fall-out, your Aerovane System goes to work. It actuates your blowers, deodorizers and scrubbers *only* when conditions require their use. At the same time, the Aerovane Recorder keeps a continuous and accurate, permanent record of *both* wind direction and speed. If litigation does develop, you'll have unquestionable evidence of wind conditions at any given hour.

In addition, the recorder provides an opportunity for the study of wind gustiness, an important factor in predicting the behavior of an effluent from a stack.

These are just a few of the reasons why you ought to investigate the Bendix-Friez Aerovane System if you have a factory-based pollution problem. Write today for full details. Bendix-Friez, 1474 Taylor Avenue, Baltimore 4, Maryland.

*REG. U.S. PAT. OFF.

Friez Instrument Division

Bendix AVIATION CORPORATION

**For more facts circle 601 on Reply Card**

# NEW PRODUCTS

(Begins on page 170)

permits ready access to trap's interior without disconnecting pipe fittings.

In operation, when the trap is first installed, the bellows is compressed against flange on the guide rod, and valve is wide open. When steam enters the trap it contacts the bellows causing it to expand quickly and close the valve. As condensate and/or air collects in the trap, the drop in temperature causes the bellows to contract, opening the valve and permitting escape of condensate and/or air. These traps are suited for capacities to 31,000 lb of condensate per hour. Pipe sizes are ½ through 1¼ in. Bulletin 257 gives data. The V. D. Anderson Co.

**To receive product data circle item numbers on the handy Reader Service Cards provided on pages 213-214.**

## 29—STAPLE NAILER drives 5000 per load

Claimed capable of driving more than 5000 staple-nails with one loading, this tool offers over 36 times the capacity of many pneumatic staplers. Each of the two narrow-crown models forms and

drives a ⅛-in. crown staple having either a ¾-, 7/16-, or ½-in. leg length, depending on cartridge used. Model 32 provides a light staple of 0.020 by 0.050-in. wire; Model 52, a heavy staple of 0.020 by 0.050-in. wire. Each staple-nail is formed from a flexible belt of precut wire lengths coiled in a compact, expendable plastic magazine. Staple nails are available with chisel, divergent and special point styles. These pneumatic tools are suited for remote operation or ganging in jigs or fixtures for assembly line production because of their long lasting, unobstructive load. The latter feature also enables the tacker to reach into restricted places. Swingline Industrial Corp.

## 30—A-C MOTORS need no complex switchgear

These four-pole motors (220 v, 1800 rpm, 20 hp and up) are offered for application requiring an increment-start motor, at the

**UNLOADING 40-FOOT LONG** structural steel columns, Breman Steel's American 300 Series yard crane averages 12,000 pounds per pick with a *flat boom*!

Operator John Smith reports that the American Self Propelled Crane is, "More flexible than others and highly mobile, too".

# AMERICAN YARD CRANE AVERAGES 6-TON LIFTS WITH FLAT BOOM!

In the yards of Breman Steel Company, an American 300 Series Crane proves its speed, versatility and mobility day after day. Working with a hook, the American Self Propelled Crane handles heavy steel beams—averaging 6-ton lifts. Equipped with a magnet, the crane loads a gondola of No. 2 scrap in 1½ hours for the Atlanta, Ga., firm. Extremely maneuverable, the 30-ton capacity crane moves easily, smoothly down narrow yard aisles to spot or pick up materials. The ability to work with a flat boom or move safely while carrying a capacity load proves the American's exceptional combination of balanced design and power. Highly responsive controls mean safe, accurate load handling!

A complete selection of interchangeable fronts—crane boom, grapple, clamshell, dragline, shovel or magnet—tailors American Self Propelled Cranes to *every* job in yards of all sizes! For magnet work American offers the exclusive, thumb controlled "over-excitation" that boosts magnet pickup capacity by as much as 20%.

A complete line of American Cranes meet the demands of every industry: crawler, truck and self propelled cranes offer capacities from ½ yard, 12½ tons to 1½ yards, 50 tons; American Locomotive Cranes—capacities to 80 tons; big American Revolvers—capacities to 400 tons! For information on the American crane to perform your job best—for the name of your nearest distributor—fill out and mail this coupon:

**AMERICAN HOIST**
and Derrick Company
*1882-1957* **75** *years of service*
**St. Paul 7, Minnesota**

**For more facts circle 602 on Reply Card**

**AMERICAN HOIST and Derrick Co.**
**Saint Paul 7, Minnesota**

Our operations require ..... ton lifting capacity—
please send catalogs on American

☐ Self Propelled ☐ Truck ☐ Crawler Cranes that meet this specification

NAME ..... TITLE .....

FIRM .....

ADDRESS .....

CITY ..... ZONE ..... STATE .....

# NEW PRODUCTS

(Begins on Page 170)

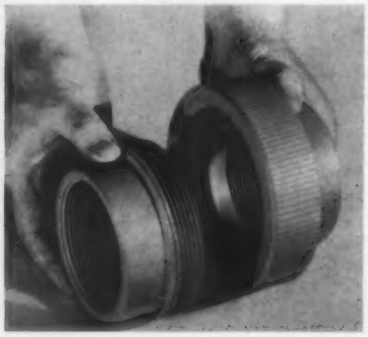
cost of a standard motor. This is accomplished by a standard two-step, three-pole, general purposes starter, with a time delay of 2 to 5 sec between the steps. Special wiring in connecting the motor is required, but this is reported relatively simple. In starting, when the first set of contacts closes, half of the motor winding is energized and the rotor begins to turn. After this first step, with its time lag, the second set of contacts closes and the breakdown torque is then identical to across the line starting. The second step parallels the remaining half of the winding in with the first half to complete the circuit, and the rotor attains the full rated rpm. The need for complex switchgear is eliminated, manufacturer points out, and motors to be run on 440 v or at a speed other than 1800 rpm can be had at slight extra cost. Brook Motor Corp.

## 31—FOOT VALVE is light in weight but rugged

This heavy-duty aluminum foot valve with strainer has been developed to be used for irrigation, construction, mine drainage, general industrial and inland marine pumping applications and for pumping "drilling mud" in oil well drilling operations. Weighing only 41 lb for the 8 in. pipe size, it features rugged construction and is reported resistant to corrosion and mechanical damage. Top and basket of valve are constructed of heavy-walled aluminum alloy castings and body is threaded and machined for easy assembly to pipe. Also made of aluminum is valve seat ring which is a replaceable. Valve flap is made of canvas-reinforced rubber that fits snugly to seating surface Clayton Mark & Co.

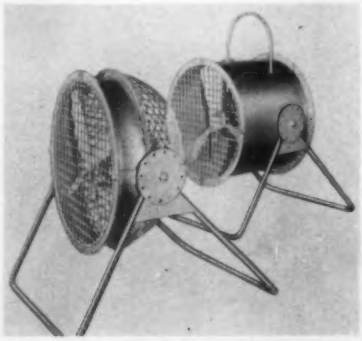
## 32—PVC PIPE UNION now available in 3-in size

This 3-in. screwed pipe union, made of corrosion resistant rigid polyvinyl chloride, increases PVC piping application possibilities, it is announced, which have been limited by availability of only smaller sized unions. Specially designed surfaces in joints of 3-part union serve to provide a tight seal. The PVC material is described as exceptionally resistant to corrosive elements in industrial atmospheres and operations. Weighing about 1½ lb, union is easily handled and installed, company says, and is available with threaded or solvent-weld socket-type ends in either high- or normal-impact polyvinyl chloride. Walworth Co.



## 33—FANS are direct connected, cradle mounted

For product cooling, man cooling, drying, recirculation, elimination of air stratification and similar uses, these direct connected, cradle mounted fans come in five sizes from 16 through 36 in., with air delivery ratings to 18,700 cfm. Designated

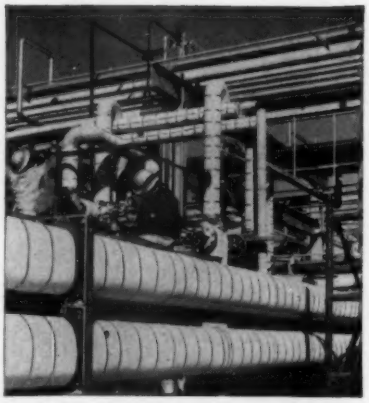


Types CU and DTU, the fans are available with venturi entrance ring or tube-axial construction. Wire safety guards on both sizes are standard equipment. A circular indexing fixture on the side of the cradle lets the fan be rotated through 360 deg to provide any discharge angle. The fans are suitable for use on floor, wall or ceiling. The fans have spark-proof aluminum-magnesium alloy propellers having airfoil cross-sections. They are powered by totally enclosed, sealed ball bearing motors. Explosion proof motors and those for abnormal temperatures or outdoor use may be had. Propellair Div., Robbins & Myers, Inc.

## 34—INSTRUMENT records, indicates speed accurately

Reported to measure and record speed with an accuracy of ± 0.1 per cent of measured speed, this recorder is for use with company's d-c tachometer generators. It can be calibrated in rpm, fpm or other units. According to manufacturer, the instrument's high accuracy is accomplished by measuring difference between tachometer voltage and a voltage from a precision reference contained in the instrument, expanding on the instrument scale. A multi-position switch is used to change value of the reference voltage in steps, resulting in a different degree of expansion for the instrument.

It is explained that standard speed recorders with ranges of 0-1000 rpm have an accuracy of ±0.25 per cent of span. Using this recorder, the total span is divided into 10 steps: 0-100, 100-200, and so on to 900-1000. Each step covers the entire scale and has an accuracy of ±0.25 per cent, it is noted, but the accuracy based on the 0-100 span would be 1/10 of this value, or 0.025 per cent.

**G-B SNAP-ON DISTRIBUTORS**

(See ad on facing page)

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**AMARILLO**, Ball Distributing & Engr. Co.
**ATLANTA**, Ga., Southern States Iron Roofing Co.
**BILLINGS**, Mont., Big Horn Supply, Inc.
**BIRMINGHAM**, Ala., Shook & Fletcher Supply
Southern States Iron Roofing Co.
**BROOKLINE**, Mass., Homans-Kohler, Inc.
**BUFFALO**, Frontier Insulation & Supply Co.
**CHARLESTON**, W. Va., Baldwin Asbestos Products Co.
**CHARLESTON HEIGHTS**, S. C., Stafford Insulation Co.
**CHARLOTTE**, N. C., Guy M. Beaty & Co.
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**TULSA**, Okla., [illegible] Distributing & Engr. Co.
**TUPELO**, Miss., Paine Supply Co.
**WASHINGTON**, Walter E. Campbell Co., Inc.
**WICHITA**, Jamar-Olmen Construction Co.
**VANCOUVER**, B. C., Fleck Brothers Limited

GUSTIN gb BACON

# *Where plant production depends on temperature control-*

## *insulate with* SNAP*ON!

The more process or steam piping you have in your plant, the more reason to use Snap*On—the one-piece pipe insulation molded of fine glass fibers. For Snap*On offers the *highest thermal efficiency at the lowest applied cost of any general purpose pipe insulation on the market* for cold or hot piping up to 350° F.

Thermal efficiency alone makes Snap*On the natural selection in plants where production hinges on piping—yet Snap*On offers many other outstanding advantages. It costs less to apply—"just open the seam and it snaps on the pipe." It's lighter and cleaner to work with. There is no breakage, no waste. It's permanent.

Snap*On is available in one-piece cylindrical sections . . . in sizes up to 33" . . . plain or with a complete range of factory-applied jackets for appearance, vapor barrier or weatherproofing. It is stocked for prompt delivery by a nation-wide network of G-B distributors. Use the best —it costs no more.

**SEE ADJOINING COLUMN FOR NAME OF LOCAL DISTRIBUTOR OR WRITE FOR COMPLETE INFORMATION**

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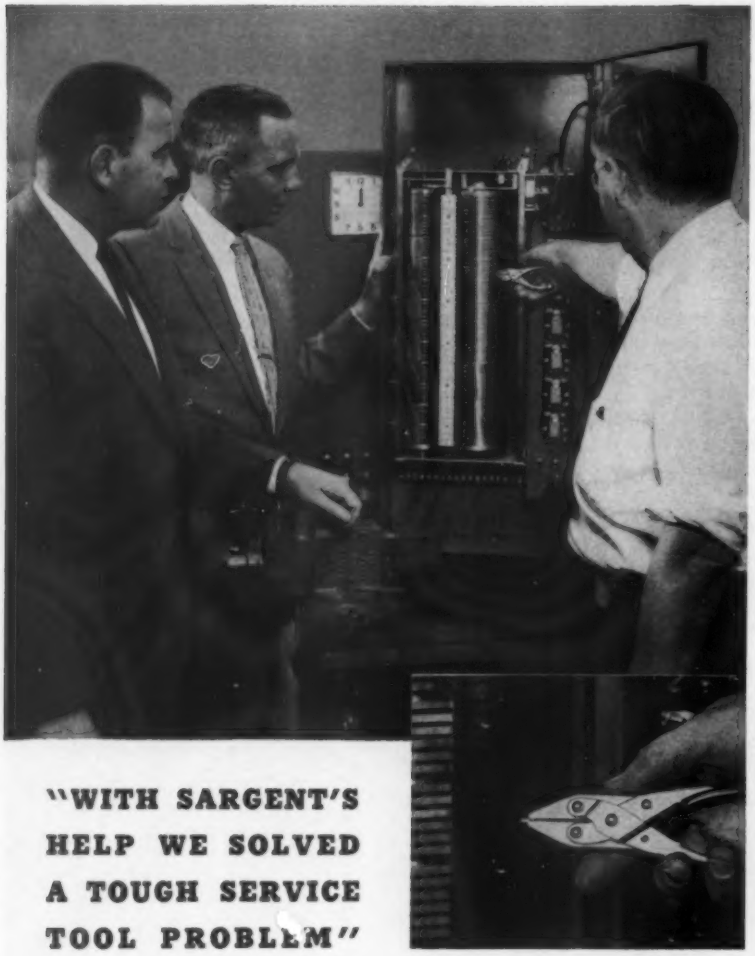
**GUSTIN-BACON** *Manufacturing Company* GUSTIN gb BACON

Thermal and acoustical insulations • Molded glass fiber pipe insulation • Pipe couplings and fittings

244 W. 10th St., Kansas City, Mo.



**"WITH SARGENT'S HELP WE SOLVED A TOUGH SERVICE TOOL PROBLEM"**

"We're proud of the fine appearance and performance of our controlled clock and program system instruments," says Leonard J. Raynsford, Supervisor of Production Engineering at Edwards Company, Norwalk. "Some of them are actually specified with glass doors inviting public inspection. So when bad marring occurred due to the user's improper selection and use of servicing tools, we had a problem."

"You see, the instruments contain two rotating perforated drums. Contact pins are hand set in the drums for signal selection. Consistent rough insertion and removal of the pins gradually marred the plating of both pins and drums, and finally burred some of the holes."

"In order to cope with possible similar severe usage by other users, we called on our industrial distributor salesman for a special tool. Taking the problem to Sargent, their designers solved it efficiently and economically by modifying one of their standard pliers with special jaws to accommodate a gripping area of less than ⅛" long, induce a snug fit, and eliminate all chance of marring. This plier was thereafter supplied with these instruments."

"Incidentally, our tool cribs contain many other Sargent hand tools, all giving excellent performance and service life."

#100
**PARALLEL ACTION FLAT-NOSE PLIER**

A powerful tool permitting maximum pressure on small surfaces. Widely used for work on intricate business machines and for aligning small parts. Jaws contain "V" slot for gripping. Sizes 4½", 5½", 6½", 8".

*For further information see your local industrial distributor — or write*

**SARGENT & COMPANY**
**Hand Tool Div., New Haven 9, Conn.**
**For more facts circle 604 on Reply Card**


# NEW PRODUCTS

(Begins on Page 170)

Company says there is an additional error (not more than 0.1 per cent) from the reference voltage and precision resistors, plus usual tachometer errors, but the end result is highly accurate system with improved readability. Bulletin GEC-1377 gives further information. General Electric Co.

## 35—WELDING PLUGS attach to all cable sizes

This low-cost set of connectors (mating male and female plugs) for use in welding cable leads and welding whips is supplied in one size that can be quickly at-

tached to all cable sizes from No. 4 through 4/0 AWG. Having a maximum welding service rating of 550 amp, connectors are announced as featuring water tight Neoprene insulating sleeves, twist-lock connections, long-lasting, low resistant engagement, and distortion-proof construction. Bulletin SM-4 gives details on these plugs. Joy Mfg. Co.

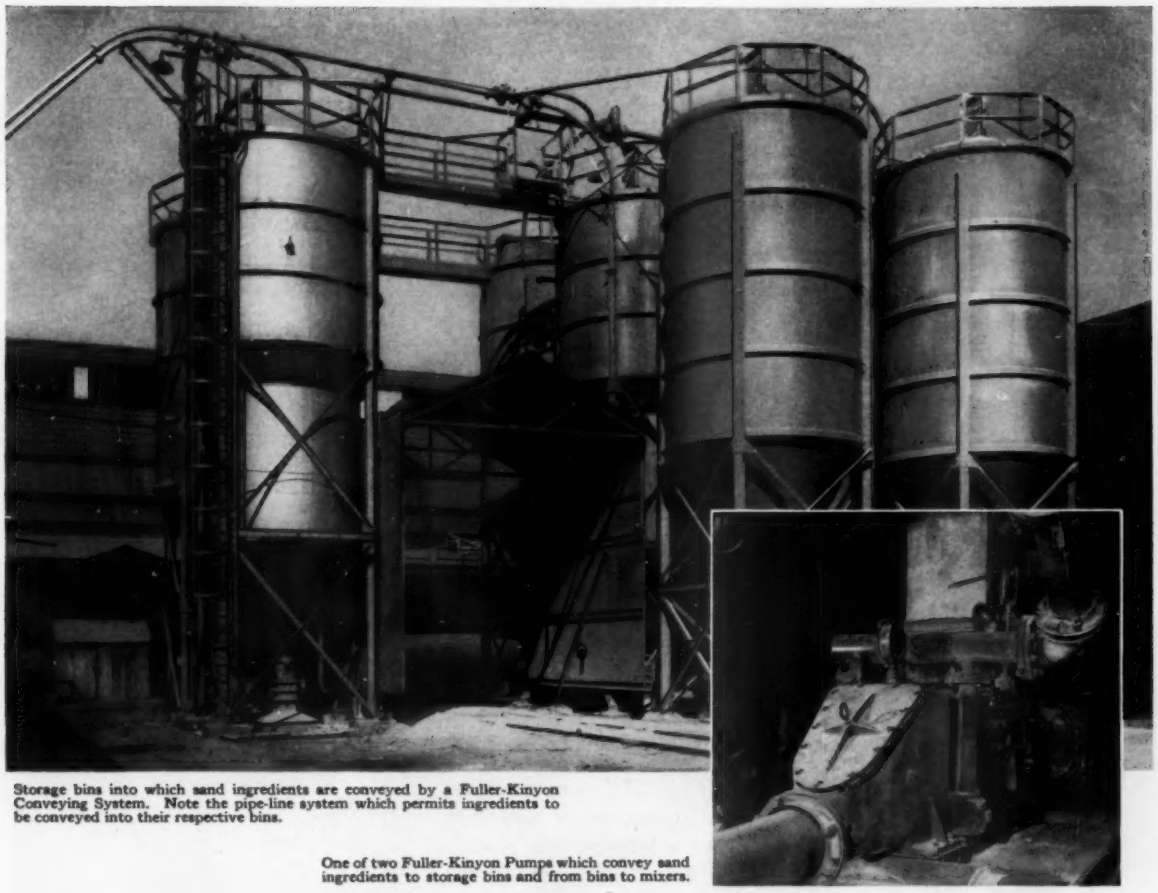
## 37—SOLVENT takes off silicone rubber coating

Monastrip EP, widely used in the electric and electronic fields for reduction of epoxy and polyester resins, is now suggested for a different purpose. According

to company, Monastrip EP will, in minutes, remove silicone rubber from wire terminals, circuits, electronic components, filter assemblies, and other parts where it is used as a protective coating. Before and after pictures show its effectiveness in this application. Mona Industries, Inc.

## 37—INSTRUMENTS for precise speed measurement

Two variations of the Jagabi Tachoscope are announced. One includes the basic instrument with a 1 to 10 ratio gear box. With this instrument you can read 0 to 10, 0 to 100 and 0 to 1000 on the dials of the revolution counter. Another new Tachoscope has a special handle and both 6- and 12-in. diam wheels, for extremely accurate measurements of length or feet per minute, and can also be used for rotational speed measurements. The instruments are accurate to a tenth of 1 per cent, says manufacturer, and the human element of error is elimi-



Storage bins into which sand ingredients are conveyed by a Fuller-Kinyon Conveying System. Note the pipe-line system which permits ingredients to be conveyed into their respective bins.

One of two Fuller-Kinyon Pumps which convey sand ingredients to storage bins and from bins to mixers.

# FULLER-KINYON CONVEYING SYSTEM HANDLES THREE DIFFERENT MATERIALS EFFICIENTLY, WITHOUT WASTE

To reduce costs and speed up handling of foundry sand ingredients with minimum waste, General Steel Castings Corporation, Granite City, Illinois, installed a Fuller-Kinyon Conveying System.

Here's what it does for them—

The system unloads corn flour, silica flour and bentonite from hopper bottom cars by means of Fuller-Kinyon Pumps which convey these materials through pipe lines to a number of storage bins. The flexibility of the system makes it possible to unload cars in a fraction of the time that would be required manually, *and*, waste due to spillage is eliminated. Two pumps used in the operation can be moved on narrow gage tracks for spotting under cars or bins. One pump is used mainly for unloading and delivery to storage—the other for delivery from storage to supply bins above the mixers. However, it is possible to unload cars and reclaim from storage simultaneously. Where bins are located so that they cannot discharge directly to a pump, an F-H Airslide® conveys from bins to the pump.

Prior to the Fuller installation, material was received in bags and manually unloaded, stored and transported to the mixers. It figures—*costs were much higher*. Now, waste has been eliminated! Another important feature—the company has realized extra savings by purchasing materials in bulk.

Fuller air-conveying systems are in operation in hundreds of plants throughout industry, cutting costs and increasing profits, day in and day out. The next time you have a materials-handling problem, why not get in touch with Fuller . . . chances are you will also profit.

GENERAL

**Fuller**

. . . . pioneers in harnessing AIR

**FULLER COMPANY** P-168 4038

**138 Bridge St., Catasauqua, Pa.**

SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION

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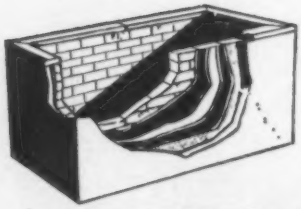
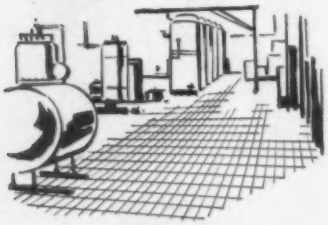
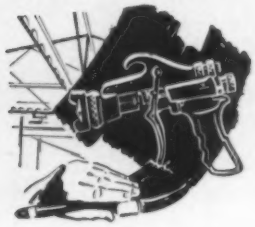
the most enduring way
to ... **STOP CORROSION**



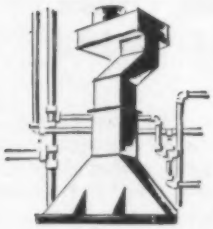
**with ATLAS TANK LININGS for steel or concrete tanks. A complete corrosion-proof covering system from primer to protective brick sheathing.**



**with ATLAS CORROSION PROOF CEMENTS for the most severe conditions. Protection against acids, alkalies, salts, solvents and other corrosives.**



**with ATLAS PROTECTIVE COATINGS for almost every purpose. A complete line to assure the proper protective coating for the job.**



**with ATLAS RIGID PLASTIC STRUCTURES for tanks, fume exhaust duct work and complete pipe systems. Fabricated of highest quality corrosion proof plastics.**

Specify **ATLAS**

***Tear out this ad and check the block where corrosion protection is most needed in your plant. You will receive a complete bulletin giving all technical information.***

☐ **CEMENTS**
☐ **LININGS**
☐ **PROTECTIVE COATINGS**
☐ **RIGID PLASTIC STRUCTURES**

ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA

**TECHNICAL REPRESENTATIVES THROUGHOUT THE UNITED STATES**

**For more facts circle 606 on Reply Card**


# NEW PRODUCTS

(Begins on Page 170)

nated in this "self checking" combination of stop watch and revolution counter. Time and motion are automatically integrated. By starting the stop watch and the revolution counter at the same instant, and allowing them to run for 30 to 60 sec or longer, and then stopping them simultaneously, scarcely any error is possible, it is stated. Speed in rpm or fpm is calculated by dividing the number of revolutions by the time in minutes. James G. Biddle Co.

## 38—CHAIN HOIST is light, easy to use

This lightweight electric chain hoist is announced as a safe, easily used and durable unit, adaptable for utilization on production lines, over machine tools, or in locations where space is at a premium. It is available in two types of reeving: the 300-2000 lb capacity, single chain unit, and the 3000-4000 lb capacity double-chain unit. Operation has been arranged for one-hand control with handles marked for

Control ropes are attached to a lever activating a controller to raise or lower the hook and also act as the limit switch conrol. The control handle action also actuates the brake shoes for release or quick stopping of the motor. Simplified and compact construction is made possible by use of a double worm and gear reduction, heat-treated alloy steel chain, load wheel and hooks.

Motors for these hoists are available for operation on standard voltages and frequencies: 115 v, single phase, 60 cycles; 220/440 v, reconnectable three phase, 60 cycles; and 550 v, three phase, 60 cycles. Wright Hoist Div., American Chain & Cable Co., Inc.

## 39—THERMOSTAT copes with heating-cooling needs

Delays in adjusting air-conditioning systems to meet daily and seasonal needs are said to be eliminated with the Type H-C Heating-Cooling Thermostat. This instrument is designed to act rapidly and positively whenever user changes it from heating to cooling—it cannot linger in a "fence-sitting position," company says. It is used with pneumatically-controlled air-conditioning systems.

For the heating cycle, the instrument operates on a 22 psi supply pressure. For cooling, supply pressure is 15 psi. Whenever supply pressure is changed, the thermostat's new relay and flapper valve (used instead of a coil spring and bel-

## THREADS ARE MACHINED BEFORE GALVANIZING

*for end-to-end protection against corrosion*

**XDUCT RIGID STEEL CONDUIT listed by UNDERWRITERS' LABORATORIES, INC.**

**National Electric Products**

PITTSBURGH, PA.

2 Plants • 12 Warehouses • 41 Sales Offices

**For more facts circle 607 on Reply Card**

**GOULDS PUMPS, INC., Seneca Falls, New York**

Check bulletins you'd like to receive:

☐ Pump Fundamentals. A brief outline of the characteristics, operation and criteria for selecting reciprocating, rotary, and centrifugal pumps.

☐ 710.1 "Close-cupld" Centrifugal Pumps.

☐ 721.6 Single-stage Double-suction Pumps.

☐ 725.4 Centrifugal Chemical Pumps.

☐ 726.1 Vertical Centrifugal Pumps.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

## How to buy a better pump

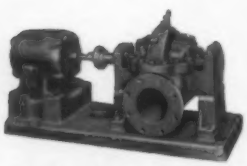
When you have to choose from dozens of pumps of different types and brands, it's hard to tell which will work best for you at the least cost.

However, when you know what to look for and how to look, you can match a pump to your needs almost exactly.

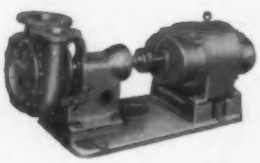
Just five of hundreds of bulletins we've prepared to help you buy wisely and well are offered above. Send for them and use them when you need a general purpose pump.

When you have a particular application in mind, write us the essentials. We'll be glad to advise you on the pump or pumps that will work best for your purpose.

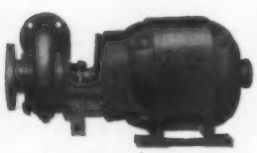
### 4 general purpose pumps



**1.** For large capacity pumping, the Goulds Fig. 3405. 33 sizes with capacities up to 6400 GPM; heads to 425 ft. Send for Bulletin 721.6.

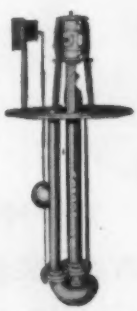


**2.** For economical handling of hot, corrosive or abrasive liquids, the Goulds Fig. 3715 stainless steel pump. 9 sizes with capacities up to 720 GPM; heads to 200 ft. Send for Bulletin 725.4.



**3.** For use where space is at a premium, the Goulds Fig. 3655 "close-cupld" pump. 20 sizes with capacities up to 2000 GPM; heads to 400 ft. Send for Bulletin 710.1.

**4.** A submerged-type sump pump for depths of 3 to 20 ft., the Goulds Fig. 3047. 4 sizes with capacities from 10 to 650 GPM; heads up to 65 ft. Send for Bulletin 726.1.



MEMBER HYDRAULIC INSTITUTE

Goulds PUMPS INC. Seneca Falls New York

Branches: Atlanta • Boston Chicago • Houston New York • Philadelphia Pittsburgh • Tulsa

*West Coast Representative:* Goulds Pumps Western, Portland, Ore.

*In Canada:* The A. R. Williams Machinery Co., Ltd. in all principal cities.

**For more facts circle 608 on Reply Card**


# NEW PRODUCTS

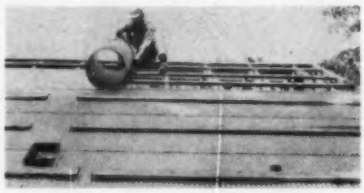
(Begins on Page 170)

lows) changes the control action. In addition, its single-ball, double-seat air valve mechanism provides larger air capacity for fast repositioning of control valves or dampers without using amplifying relays, manufacturer explains, and this mechanism also prevents constant air waste. Temperature range is 60-85 F with a factory adjusted set point of 75F. The thermostat is available in a room type with exposed adjustment, room type with concealed adjustment, and remote bulb type with exposed adjustment. Form P-50 gives details. Powers Regulator Co.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

### 40—ROLL-ON ALUMINUM for roofing, siding

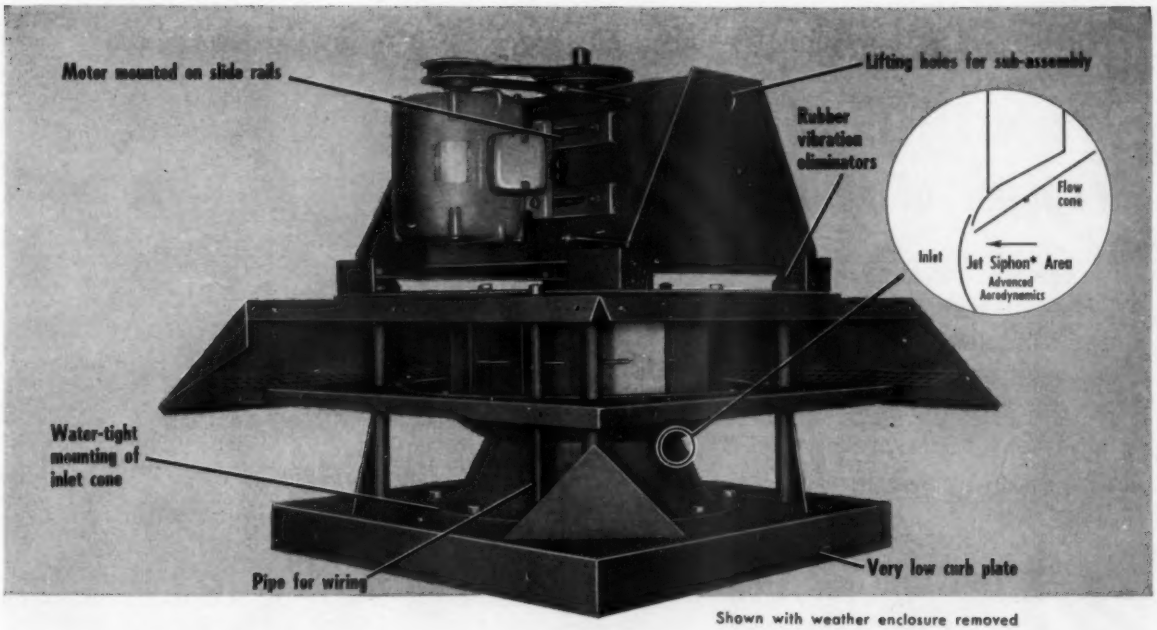
"Just roll it on and nail it down" sums up the installation procedures for Roll-On Roofing and Siding, according to manufacturer. It is made of embossed corrugated aluminum in a standard 0.019-in.



thickness and comes in easily handled rolls. Each roll contains 50 lineal feet, but is so compact and light that one man can carry it, it is stated, and two men can cover a roof quickly with the material. It comes in 18-, 30- and 54-in. widths. Regular metal shears are used to cut across corrugations, while special lengths—if needed—can be obtained by scoring corrugations with a roofer's knife and then bending at the score mark. Company points out that side laps are virtually eliminated with this roofing, to better protect against wind, weather. Kaiser Aluminum & Chemical Sales, Inc.

### 41—GLOBE VALVE is motor operated, compact unit

This motorized valve is said to incorporate almost all desirable features of automatic valve operation in one simplified, powerful, inexpensive unit. Available in 10 sizes—¼ to 3 in.—and three voltages —24, 115, and 230 v—the unit is easily adaptable in heating, air-conditioning, processing, and equipment manufacturing. Manufacturer says it features automatic disc compensation, tight shut-off, 150 lb pressure capacities on most sizes, no




Shown with weather enclosure removed

# PLUS VALUES... all yours in the Clarage Centrilator

POWER ROOF VENTILATOR — CENTRIFUGAL TYPE

Jet Siphon* feature for stable, high efficiency.

Static pressures to 2" — thus well suited to both light-duty installations without ductwork and applications where ductwork or hoods impose considerable resistance.

Adaptable to a wide range of motor sizes.

Variable pitch V-belt drive.

Wheel and inlet designed for streamlined air flow.

Built heavy-duty throughout to assure long-lasting, trouble-free service.

Every wheel statically and dynamically balanced on precision machines.

Inspection panel and complete accessibility.

Low overall height.

Venting of motor and drive area.

Engineered and constructed for extra quietness.

Heavy-duty anti-friction bearings.

Simple installation — only 4 bolts required.

**Write today for Bulletin 550. Clarage Fan Co., Kalamazoo, Mich.**

CLARAGE

*Patent applied for

*...dependable equipment for making air your servant*

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

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# NOW···GLOBE OFFERS···
## two new INTERCHANGEABLE trays for support of cables, wiring and tubing

★ Engineered for uniform design and easy installation
★ Steel or aluminum construction
★ Complete accessories for SPEEDIER Installation
★ No sharp edges to damage cables
★ Complete interchangeability

Now, for the first time, two types of cable trays, one a ladder type and the other a basket type, are available to be used INTERCHANGEABLY at any given location, depending on the type and weight of the cables to be suspended. The advantages of each type tray can thus be used to the fullest extent. Globetray, the ladder type, is intended for use where festooning is not a problem, while Cable-Strut, the basket type, is intended for the support of communication wire, instrument tubing and control cables in automation applications.

These two cable trays have been thoroughly field tested in hundreds of large industrial installations, in new plant construction, in power plants, in modernization, and for power distribution in all types of manufacturing processes. A new catalog, just off the press, gives full information and installation techniques. Ask for your FREE copy today.

*Distributors are to be found in all principal cities—consult the yellow pages in your phone book under "Gratings" or "Conduits" for the one nearest you.*

109

**PRODUCTS DIVISION**

*The* **GLOBE** *Company* MANUFACTURERS SINCE 1914

4016 SOUTH PRINCETON AVENUE, CHICAGO 9, ILLINOIS

**For more facts circle 610 on Reply Card**

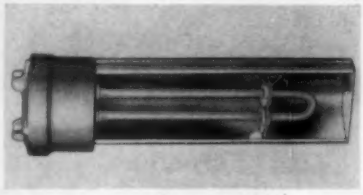

# NEW PRODUCTS

(Begins on page 170)

mounting restrictions, permanent lubrication, quiet, positive operation without linkage, compact size. Valve can be controlled by any positive action single-pole, double-throw switch such as temperature, float, manual, time, program, or pressure actuated switches. New England Gear Works.

### 42—RADIANT HEATER with liquid-tight construction

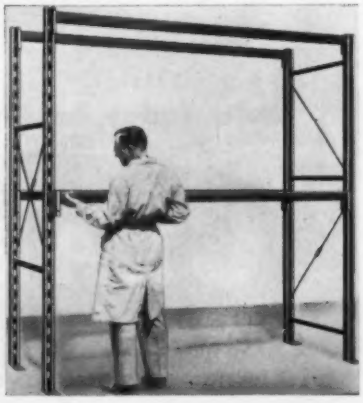
Designated Chromalox U-RAD-LT, this liquid-tight electric radiant heater is designed for industrial applications in which uncontrolled heavy splashing is present or where periodic washdown is

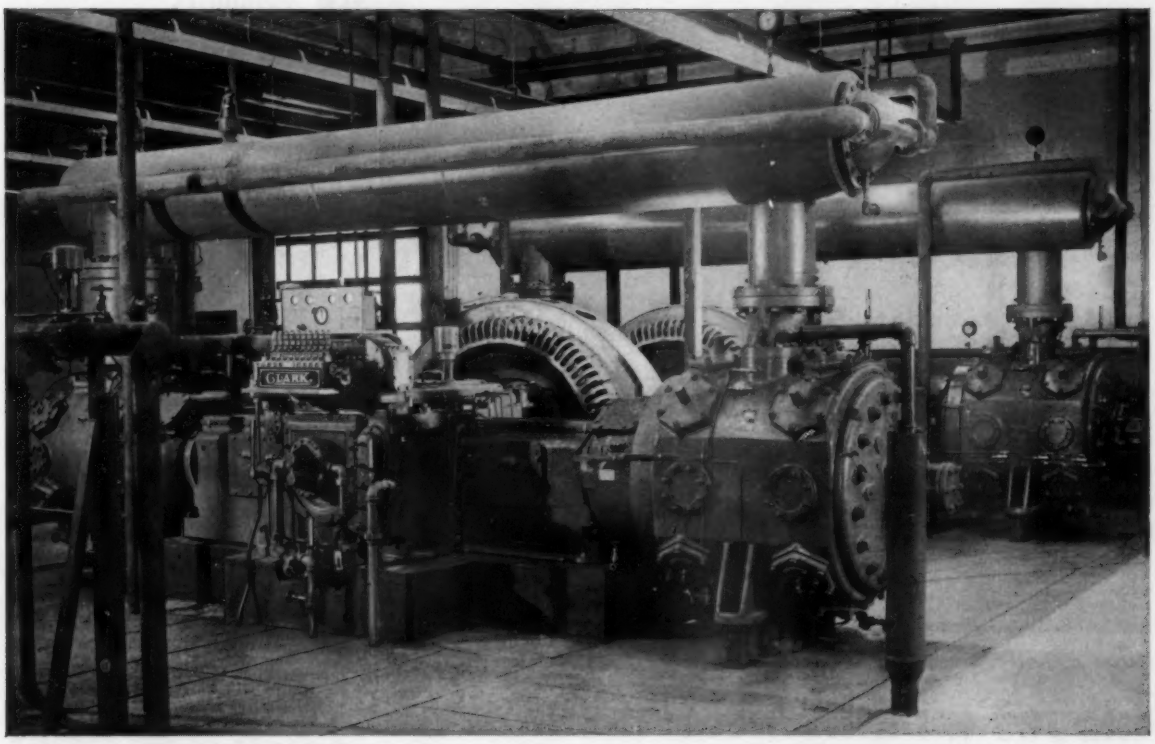


required, as in food plants. The construction is also suitable for outdoor comfort heating. The heating element is U-shaped Chromalox tubular with a rating of 94 w per lineal inch of heated length. The element is centered in a rigid extruded aluminum housing with polished metal reflector. Heaters have movable clamps and are readily bolted to drilled holes in angle iron, steel strap or other mounting provisions. Twenty-seven standard heated lengths are available, from 8 5/16 to 77⅞ in. with overall lengths from 13 5/16 to 87¼ in. Special ratings and lengths to 165 in. may be had. Standard wattages are from 800 to 7200; voltages are 120, 240 and 480. Edwin L. Wiegand Co.

### 43—STORAGE RACK adjusts without bolting, unbolting

Slide-n-lock is described as completely adjustable without bolting or unbolting. The stringers are quickly moved up or down a special formed post and designed to lock themselves in place. An outstand-






# What Jules Verne couldn't foresee!

Around the world, 24,325 miles of it, in 45 hours and 19 minutes... our strategic B-52 bombers did it non-stop! This speedy trip made Jules Verne's "80 days" seem like a lifetime. Part of the B-52 – the electrical pneumatic units that drive generators to provide the muscle for operating flaps, gun turrets, radar and countless other operations are provided by Thompson Products, Inc. of Cleveland, Ohio. Four of these 205 horsepower units go into every B-52. To be certain they are perfect, Thompson gives them a thorough test before shipment. One 350 horsepower Clark CMA-4 and two Clark 600 horsepower CRA-2 air compressors furnish the air for testing.

There is a vibrationless Clark balanced/opposed compressor for practically every requirement. Sizes range up to 6000 horsepower. Your nearest Clark representative has all the facts.

**CLARK BROS. CO.** **OLEAN, NEW YORK**
*One of the Dresser Industries*
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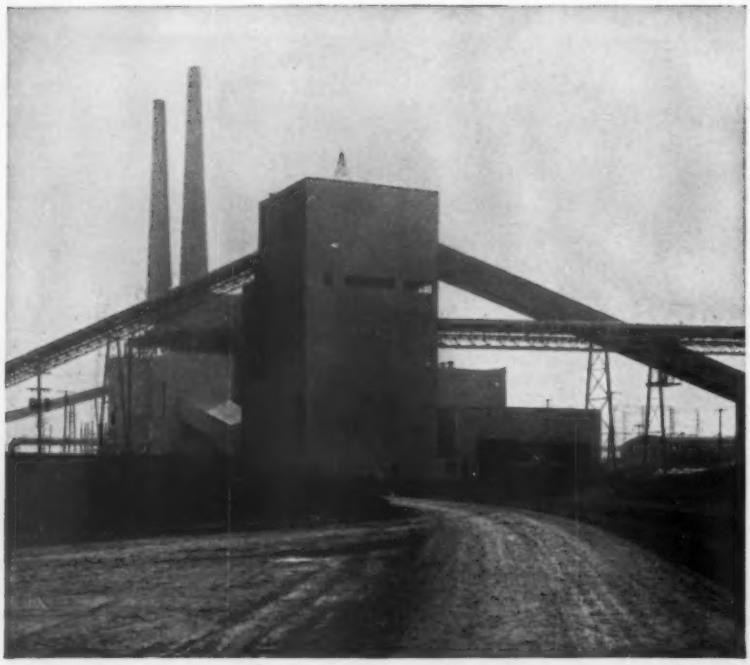
**CLARK** **Balanced/Opposed Compressors**

**For more facts circle 611 on Reply Card**



# Moves a million-ton mountain of coal a year!

*One of the largest in the U. S., this system depends on over 7,000 feet of Quaker Rubber belting to keep the coal moving.*

**PROBLEM:** The Detroit Edison Company needed three separate conveyor systems to carry coal into their River Rouge power plant: (1) dock to storage, (2) dock to breakers to plant, (3) storage to breakers to plant.

**SOLUTION:** Quaker engineers and the Quaker distributor's men, working with engineers of the power plant, suggested the use of a belting designed for high lifts and long center distances. Over 7,000 feet was installed.

**RESULT:** The three conveyor systems work smoothly and efficiently, carrying coal into the plant at the rate of one million tons a year.

**YOUR PROBLEM:** Whatever your conveyor needs, whatever your industry—there's a Quaker Rubber Belt (or Hose) of the *right* construction to handle the job safely and economically. Quaker engineering service is available for the asking.

To make sure 7,000 feet of Quaker Rubber conveyor belting (available in 48", 60" and 72" widths) was properly installed, splicing and vulcanizing of the belting was supervised by a Quaker Rubber specialist.

For your free brochure on conveyor belting, write your nearby Quaker Rubber distributor, or:

*H. K. Porter Company, Inc.,*
*Quaker Rubber Works,*
*Philadelphia 24, Pa., or*
*Pioneer Works, Pittsburg, Calif.*

HKP QUAKER RUBBER DIVISION
H. K. PORTER COMPANY, INC.

For more facts circle 612 on Reply Card

# NEW PRODUCTS

(Begins on Page 170)

ing feature claimed for the unit is that over 800 different sizes and capacity variations can be made from five basic parts. Neither bolting nor welding is required in the erection of this rack. American Metal Products Co.

## 44—FLOATING FIXTURE gives shadowless lighting

Glare-free lighting, spread evenly throughout the room is claimed possible with the Strato-Lux, a ceiling-size "floating" fixture. The entire luminaire is suspended from the lighting grid attached o the ceiling. Manufacturer states that since there is no juncture between fixture and side walls, the fixture seems to float,

creating a sense of light airiness. Applications include offices, drafting rooms, lobbies wherever a ceiling wide expanse of low brightness lighting is desired.

Supplied as a complete unit, the fixture is actually a packaged lighting system and consists of two parts: a ceiling installed fluorescent grid system, and a suspended T-hanger aluminum framework, which holds the vinyl plastic louver-diffuser panels. The 2-by-2 ft panels are company's new CurtiCell louver-diffusers which provide 25-deg crosswise and lengthwise shielding. They act both as louver, shielding the eye against glare, and as diffuser, softening the light and minimizing glare. Strato-Lux lighting systems can be provided in sizes to fit an 8-by-8 ft or larger room. Curtis Lighting, Inc.

## 45—PRETREATMENT for coating metal surfaces

Bindox is introduced as a pretreatment coating for metal surfaces. Its basic ingredient is rice oil, said to have excellent penetrating and adhering qualities, and to contain a natural wax and other properties highly resistant to corrosive action. According to manufacturer Bindox has a high flash point (450 F) which makes it adaptable for pretreating hot castings; after thorough drying the film remains stable up to 600 F.

Bindox may be applied by brush, spray or roller, or dipping. It comes in three formulations. Superfine Free-X, for deli-

*Designed expressly to fulfill the requirements of Associated Factory Mutual and Underwriters' Laboratories.*

# New Industrial Gas Pressure Switch offers 4 exclusive safety features

USE this new Honeywell C437A Industrial Pressure Switch as a safety cutoff on multiple burner gas installations . . . as a pressure controller for hazardous gases . . . or as a differential controller for air or non-hazardous gases. It's simply designed, yet provides complete protection.

The C437A Industrial Gas Pressure Switch has these exclusive safety features:

**1. Sealed Pressure Chamber**—Should the diaphragm rupture from over pressure or any other cause, gas can't escape into the switch compartment or to the atmosphere. The pressure chamber is fitted with a pipe tap to permit venting to the stack.

**2. Protected Settings**—All adjustments are inside the case for protection against careless or accidental manipulation. A metal plate on the side of the case must be removed before changes in adjustment can be made.

**3. Ever-Visible Switch Position and Control Settings**—The entire cover of the pressure switch is a window. Position of the mercury switch and adjustment of the control settings can be determined at a glance.

**4. Lockout Mechanism**—An optional safety feature, when manual resetting is desired. The lockout mechanism prevents the switch from remaking contact after pressure has once dropped below the setpoint . . . even though pressure returns to normal. The lockout release button is the only adjustment that can be manipulated without removal of the protecting metal plate.

For complete information, call the nearest Honeywell office. A Honeywell sales engineer is as near as your phone.

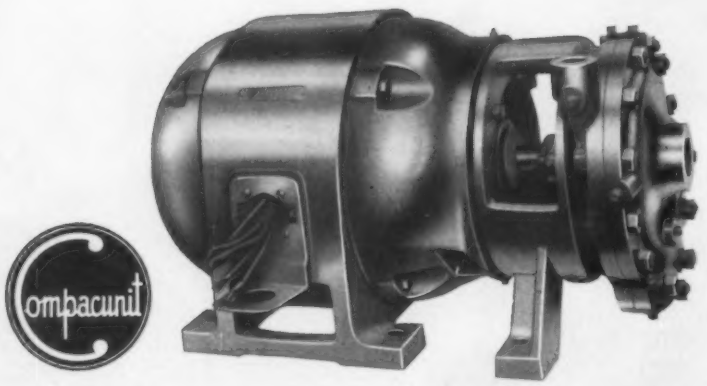
MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.—in Canada, Toronto 17, Ontario.

● **REFERENCE DATA:**

**Send for Specification S1011-1 Honeywell Gas Pressure Switch C437A**

MINNEAPOLIS **Honeywell**
BROWN INSTRUMENTS
*First in Controls*

# A NEW WARREN Centrifugal



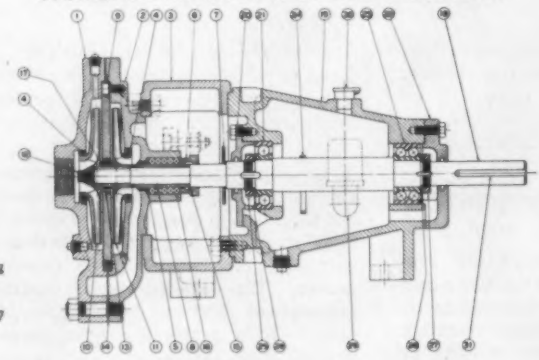

## Type 1CH 2-stage pump is designed and priced for low-capacity, high head jobs

Here is another cost-saving addition to the Warren line of *Compacunit* Close Coupled Pumps.

Capacities - 5 to 60 gpm
Heads - 200 to 375 ft.

The new Warren 1 CH is important too for its simplicity and compactness . . . and every part is designed for long life and protection against wear. It is also available with a cradle mount (Type 1 CHC).

SECTIONAL ELEVATION OF NEW 1 CHC PUMP



**DESIGNATIONS**

1. Casing—1st Stage
2. Casing—2nd Stage
3. Frame
4. Case Ring
5. Stuffing Box Bushing
6. Gland
7. Flinger
8. Shaft Sleeve
9. Center Section
10. Impeller—1st Stage
11. Impeller—2nd Stage
12. Impeller Nut
13. Center Section Bushing
14. Gasket
15. Gasket
16. Packing Anchor No. 317
17. Impeller Key
18. Shaft

**RATING CHART**

| 1-CH or 1-CHC Bulletin | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| HD | GPM | 5 | 10 | 15 | 20 | 30 | 40 | 50 | 60 |
| 275 | | 7½ | 7½ | 7½ | 7½ | 7½ | 7½ | 10 | 10 |
| 300 | | 7½ | 7½ | 7½ | 7½ | 7½ | 7½ | 10 | 10 |
| 325 | | 7½ | 7½ | 7½ | 7½ | 7½ | 10 | 10 | |
| 350 | | 7½ | 7½ | 7½ | 7½ | 10 | 10 | | |
| 375 | | 7½ | 7½ | 7½ | 7½ | 10 | | | |

**AVAILABLE IN THESE MATERIALS**

| PART | STANDARD | ALL IRON | ALL BRONZE |
|---|---|---|---|
| Suction Head | Cast Iron | Cast Iron | Bronze |
| Casing | Cast Iron | Cast Iron | Bronze |
| Impeller | Bronze | Cast Iron | Bronze |
| Impeller Nut | Bronze | Stainless Steel | Bronze |
| *Shaft | Steel | Steel | Steel |
| *Shaft Sleeve | Bronze | Cast Iron | Bronze |
| Seal Cage | Cast Iron | Cast Iron | Bronze |
| Gland | Cast Iron | Cast Iron | Bronze |
| Flinger | Cast Iron | Cast Iron | Cast Iron |
| Frame | Cast Iron | Cast Iron | Cast Iron |

*Shaft sleeves available in Nitralloy Nitrided, Hardened Stainless steel or Monel and shafts in Stainless Steel or Monel on special order.

ASK FOR BULLETIN NO. 242

WARREN PUMPS, INC.
WARREN, MASSACHUSETTS

G-7

For more facts circle 614 on Reply Card

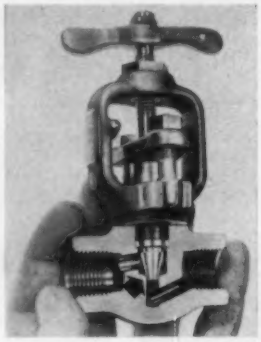

# NEW PRODUCTS

(Begins on Page 170)

cate instruments, is to be used in the same manner and for the same purpose as penetrating oils. Rapid X3-100, is a pretreatment for indoor metals and aids in the removal of heavy rust and scale. Heavy duty Rust-X is for exposed metal surfaces such as outdoor machinery and equipment. Bindox has a slight paint-like odor, does not deteriorate in the container, says manfacturer. All three formulations come in clear, light amber form. Rust-X also comes in red, gray. Guardian Chemical Products, Inc.

## 46—INSTRUMENT VALVES offer greater seat hardness

Welding advantages of carbon steel and seat wear characteristics at least equal to stainless steel are said to be combined in these high temperature instrument valves. Wearing qualities are improved by incorporation of an integral seat insert of



chrome-cobalt-tungsten alloy (see arrow). As the body of the valve is carbon steel it can be welded into carbon steel pipelines with ease and efficiency not possible with a stainless steel body, manufacturer states. Screwed ends may be had, too.

Rated at 2500 lb at 850 F, the new valves have drop forged steel bodies and yokes and swing bolted glands for easy repacking. Precise flow control is attributed to use of a tapered needle point stem disk and fine pitch screw threads. The new line is offered as a successor to company's previous carbon steel instrument valves—the stainless steel body line will continue in production for applications requiring extreme corrosion resistance. Bulletin 571 gives details. Edward Valves, Inc.

## 47—CORROSION INHIBITOR for cooling tower systems

Nalco 360 is basically a chromate type material to which other inhibitors, each exerting a synergistic effect on the others, have been added. The resulting combination is said to provide better corrosion control than any of the several inhibitors used alone. It is claimed effective over a relatively wide range of pH conditions. Nalco 360 is produced in 3-in. diam ball briquettes, about 1 lb in weight. To apply

# Your "Cost" Dollars Come Back QUICKER...

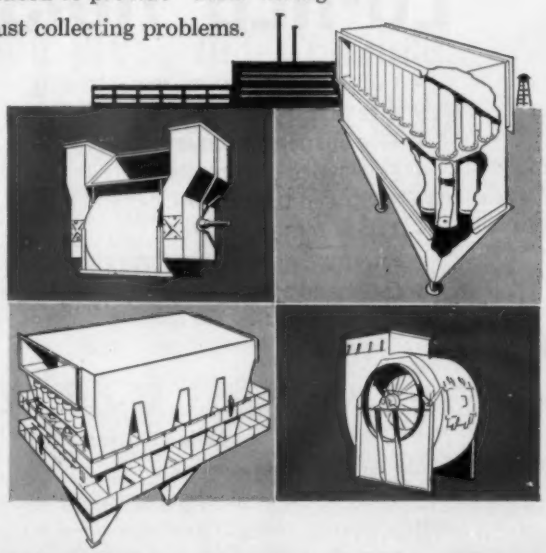
**with WHIRLEX dust collecting equipment!**

If you are concerned with nuisance elimination . . . or with the recovery of process material . . . WHIRLEX can help you. Our research laboratory, engineering and manufacturing facilities are *totally set up* and especially experienced to provide "dollar-saving" solutions to the most perplexing dust collecting problems.

Low original cost *plus* continuous, efficient operation and low maintenance of WHIRLEX equipment assure quickest return of cost dollars!

**For a completely integrated and co-ordinated installation, the following shop-assembled equipment is available:**

**WHIRLEX Type CTF Mechanical Gas Centrifuge Collectors**
**WHIRLEX Type MTSA 9CYT Multiple Cyclone Collectors**
**WHIRLEX Induced Draft Fans · WHIRLEX Forced Draft Fans**
**Special Duct Work · Self-Supporting Stacks**
**Support Structures**



FLY ASH WHIRLEX ARRESTOR

*Write today for complete engineering data . . .*

**THE FLY ASH ARRESTOR CORPORATION**

256 North First Street — Birmingham, Alabama

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CUT YOUR OVERHEAD

*in materials-handling problems with*

ELECTRIC CUSTOMIZED

LO-HED HOISTS

- Cuts overhead space requirements
- Five classes lift ¼ to 12 tons
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- Four types of controls
- Shrouded bottom block
- Two automatic brakes
- Anti-friction bearings throughout
- One-hand operation
- Full load tested

Write for literature describing the Customized Lo-Hed Hoist or the pace-setting AE Standard Lo-Hed, available in 2- and 3-ton capacities —the latest word in modern hoist engineering and materials.

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AE Products are: Taylor, Perfect Spread and Vibra-Grate Stokers, Helo-Shaw and Hydromite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers, Marine Deck Auxiliaries.

For more facts circle 616 on Reply Card

# NEW PRODUCTS

(Begins on Page 170)

the chemical a simple by-pass feeder is normally used. Cooling water passing through the feeder dissolves the ball briquettes and carries the solution of chemical treatment back into the cooling water line. Or the briquettes are merely dissolved in a wire basket suspended in the cooling tower basin. Nalco 360 is applicable to a variety of cooling waters, it is noted, but should not be used to treat potable waters or in cases where contamination of potable waters might occur. National Aluminate Corp.

**Reader Service Cards on pages 213-214 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.**

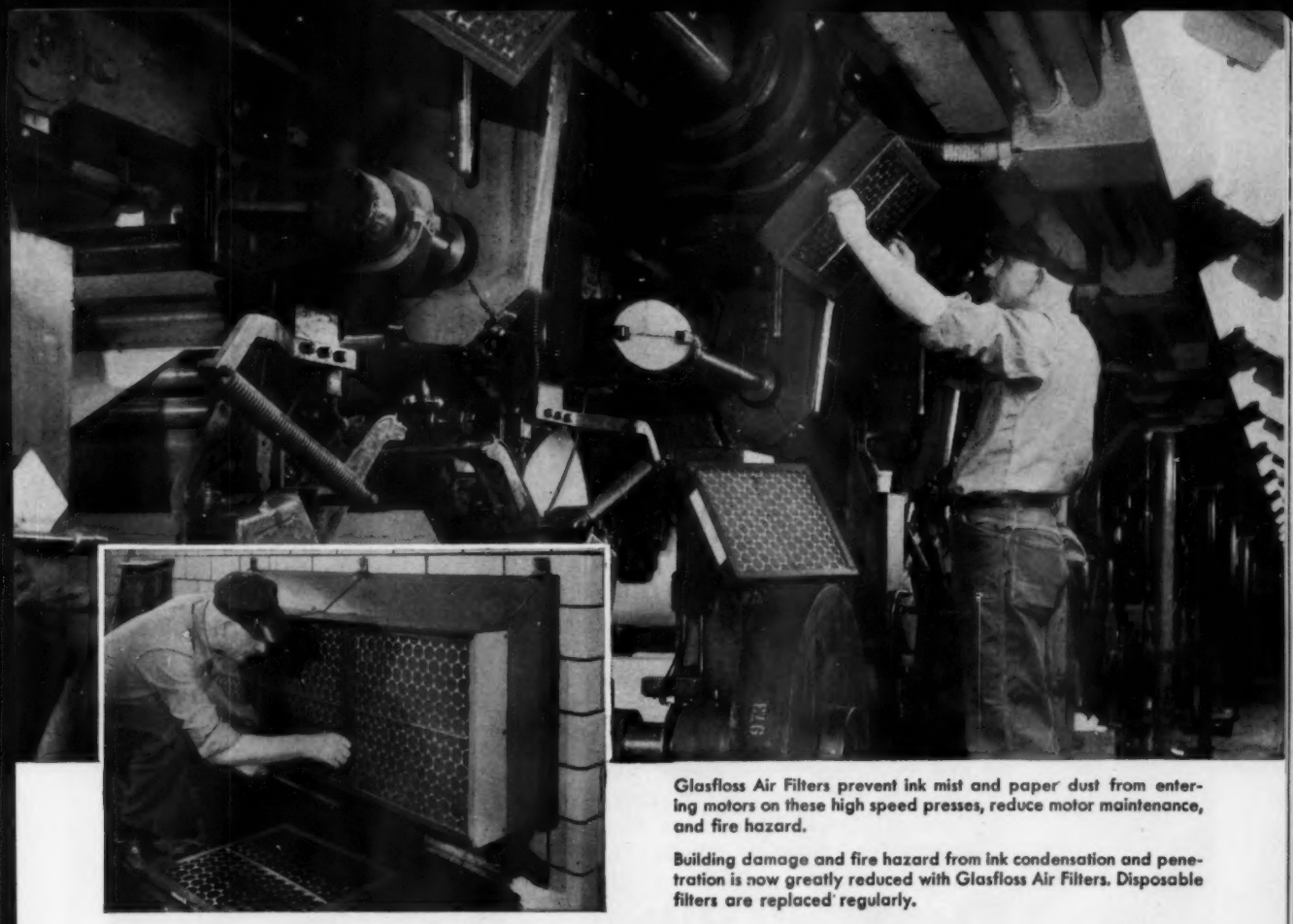
## 48—ALUMINUM JACKET for the insulated pipe

Aluminel is a preformed, two-piece aluminum ell jacket for insulated pipelines—introduced as a replacement for weatherproofing of insulated pipe ells in refineries and chemical plants.It is designed to

snap together longitudinally around the ell and join smoothly with straight jacketing. Aluminels come in 90-deg angles for seven sizes of pipe from 2 to 12 in. Variations are available in each size for 1- to 3 in. insulation. Aluminels are coated internally with an epon vapor seal barrier. They may be fastened to the insulated pipe ells by strapping, sheet metal screws or adhesive. Company recommends the latter and is manufacturing a special adhesive for this purpose. Worthwhile savings in initial cost, installation and maintenance costs are reported for Aluminels. Preformed Metal Products Co.

## 49—FUSE, high voltage, greater interrupting capacity

The 9F9D-9 is announced as a high voltage fuse with 3.3 times the 60-cycle interrupting capacity of its predecessor. It is now standard with company's stack rack capacitor equipments utilizing 50-kilovar units. The fuse is reported to isolate faulty units, allowing a capacitor bank



Glasfloss Air Filters prevent ink mist and paper dust from entering motors on these high speed presses, reduce motor maintenance, and fire hazard.

Building damage and fire hazard from ink condensation and penetration is now greatly reduced with Glasfloss Air Filters. Disposable filters are replaced regularly.

# Glasfloss* Air Filters lessen press maintenance, reduce ink mist hazard at Rochester Times Union

The Rochester Times Union, Rochester, N.Y., had two serious problems common to most newspaper plants, according to Mr. Arnold J. Cunningham, the newspaper's building superintendent.

1. Ink mist and paper dust from 15 press-unit drive motor intakes required the cleaning of internal motor parts every three months. This caused production delays, and thorough cleaning was not always possible.
   *Solution:* Glasfloss Fiber Glass Air Filters were installed on special frames. Now motor cleaning is done only once every six to eight months, and less time is required. Light vacuuming of filter faces daily allows maximum air intake. Motor operating temperatures are lower and a fire hazard is reduced.
2. Ink condensing inside the air ducts created an extreme fire hazard and ink-spot damage to ceilings and equipment. Paper dust caused extreme surface loading and this impeded the passage of ink mist through the filter.
   *Solution:* After extensive testing of many filtering devices, Glasfloss Filters proved to be the most satisfactory. Through regular rotation and replacement of filters, the fire hazard has been greatly reduced. Building damage from ink condensation and penetration is very slight. Filtering costs are at a minimum.

*Trademark

## GLASFLOSS AIR FILTERS CAN HELP YOU, TOO!

Pittsburgh Glasfloss Air Filters are made from fine, soft fiber glass which provides a greater, more efficient dirt-and-dust-collecting area. Glasfloss Filters are soft and easy to handle; this fiber glass will not splinter or pierce the skin.

Get top results with Glasfloss Air Filters. Write for the name of your nearest Glasfloss distributor. *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pennsylvania.*

**GLASFLOSS FILTERS ARE A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY**

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh and St. Louis

FIBER PG GLASS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

**For more facts circle 617 on Reply Card**

# MORE GALLONS

If your liquid moving problem is primarily a matter of pumping efficiency . . . more gallons per kilowatt hour . . . then you should get the facts about Ingersoll - Rand's line of Motorpumps.

Its high efficiency results from a well-designed and expertly finished impeller and casing . . . carefully selected for each job from the most extensive line available . . . a good stuffing box or mechanical seal . . . and the best brand name motors.

In addition, the powerful Motorpump is built for long life, low maintenance and operating dependability. Get complete information by contacting the local Ingersoll-Rand branch office or write for a complete bulletin.

MOTORPUMP

by

Ingersoll-Rand

11 Broadway, New York 4, N.Y.

Sizes ¼ to 75 hp
—capacities to 2800 gpm
—heads to 650 feet

9-591

For more facts circle 618 on Reply Card

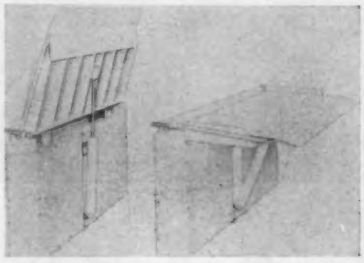

# NEW PRODUCTS

(Begins on Page 170)

to continue operation without danger of rupturing a failed capacitor. A fiber glass tube wall is designed to give fuse superior mechanical strength and a high degree of resistance to natural elements. According to company, this tube strength provides satisfactory operation of fuse when stored energy of an adjacent capacitor is four times greater than previously permitted. It is installed by screwing one end into the buswork of a bank of equipment. A lead from fusable element extends from other end and is attached to capacitor terminal. Fuse is rated 8.7 kv, 4,000 amp. General Electric Co.

## 50—RAMP increases use of loading dock

The Rail-O-Matic is a mobile dock ramp which rides on its own rail to load or unload from any spot on the dock. Manufacturer says it is easily installed on any platform, requires no concrete pits and can be stored out of the way—yet offers flexibility to handle trucks at whatever



spot they pull up to load or unload. The platform has a 24-in. adjustment range.

When not in use, the Rail-O-Matic can be stored or parked at any point along the dock. The approach plate is hydraulically locked in an upright position parallel with the edge of the dock—so that the complete installation is out of the way and protected against damage. It is noted that the unit cannot be moved in either its parked or working position. The dock-side rail on which the Rail-O-Matic rides can be mounted to an existing or new dock. A foot control raises and lowers ramp. One man can move it from one loading position to another, it is noted. A heavy approach plate carries traffic weight. Wayne Pump Co.

## 51—WATERPROOFING protects masonry surfaces

Water-Stop is an "invisible" waterproofing liquid formulated from Pliolite S-5, synthetic rubber resin, plus a silicone resin. Pliolite S-5, produced by Goodyear Tire & Rubber Co., adds water resistance, toughness and durability, while the silicone is said to provide superior penetration and water repellency. For use on brick, concrete, concrete block, cinder block, stucco or gypsum, Water-Stop is claimed to halt water penetration without altering external appearance of the struc-

From the well to "Wabash and Main"...

# LELAND EXPLOSION-PROOF MOTORS BRING YOUR FUEL

Oil and gasoline, butane and propane, and other hazardous liquids must be "pushed" into service! And the Petroleum Industry calls on Leland explosion-proof motors to do the pushing, safely and surely—from oil fields all the way to your car or door. Underwriters' Listed for Class 1, Group "D", naturally!

And Leland-powered pumps are "naturals" in *every phase* of this giant operation. They're at work in the oil fields, the refineries, at transfer and storage points, in giant fuel trucks, and even underground *in* gasoline tanks ... taking the worst the weather offers and the heaviest work loads...delivering the performance the job demands!

For over 30 years, Industry has looked to Leland for the finest in motors. With its complete explosion-proof line, including both integral and fractional, single phase and polyphase—plus its complete line of other standard motors, as well as a wide variety of specials—you'll find Leland is the answer to practically any motor need, from ¼ to 5 HP, soon through 10 HP. Why not investigate Leland? Write or call today.

Another AMF Product

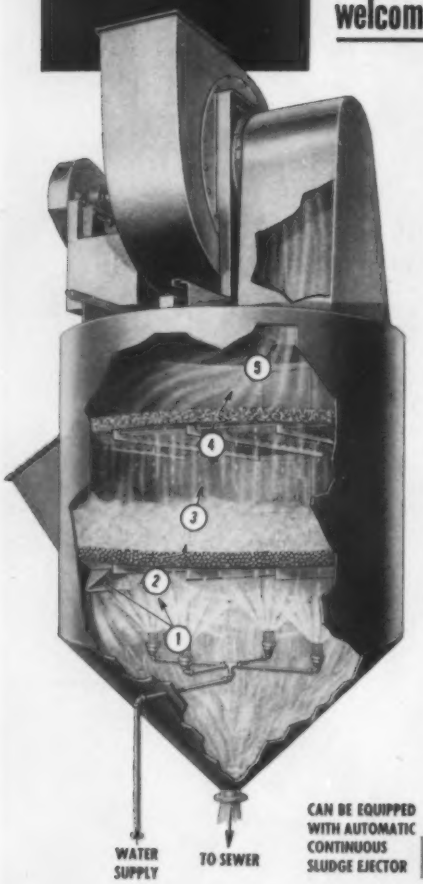
LELAND MOTORS

**THE LELAND ELECTRIC COMPANY**
Dayton 1, Ohio
Division of AMERICAN MACHINE & FOUNDRY COMPANY

**For more facts circle 619 on Reply Card**

Here's how the
NATIONAL
HYDRO-FILTER
Works:

Why it combines exceptional efficiency with welcome ease of maintenance




**1** Large dust particles are thrown out of the air stream as it changes direction upon entering collector. This portion of the dust load is trapped by contact with the wet surfaces of the conical chamber.

**2** The air with its remaining dust load starts a torturous, deflective path through the bed packed with glass spheres. Dust is impinged on wetted surfaces and flushed downward continuously.

**3** Air is converted to bubbles in pool of violently turbulent water and mist maintained above filter bed. Small dust particles are trapped in water droplets.

**4** Air approaches moisture eliminator bed through more mist and droplets. Moisture and micron dusts are entrained on surface of packing media and returned to the bottom of the collector.

**5** Clean air is exhausted to atmosphere.

Air, water and glass spheres do the work in Hydro-Filter. There are no moving parts in the collection area—nothing to "load up"—no "dead" areas or "critical" water levels to maintain. The relatively simple design permits economical use of special materials of construction. A complete *continual* flushing of all interior surfaces insures its self-cleaning action.

The Hydro-Filter is designed to maintain *constant high level efficiency* over wide variations in volume of air and dust loads. It is easy to operate and understand. Its simplicity of design has proven ease of maintenance unmatched by *any* equipment for similar use. Write for literature on the National Hydro-Filter *today*.

HYDRO-FILTER

National Dust Collector Corp.

604 Machinery Hall Building • Chicago 6, Illinois

For more facts circle 620 on Reply Card

# NEW PRODUCTS

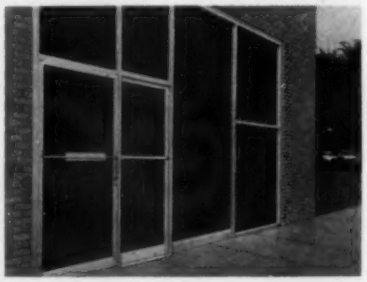
(Begins on page 170)

tural material. Coating only the lining of the pores, water repellency is achieved without eliminating transfer of water vapor, it is explained. Performance data is reported to show water absorption of common brick reduced from 16.9 to 0.01 per cent.

Other advantages are also claimed for Water-Stop. The sealed surfaces stay cleaner since dirt doesn't penetrate and is flushed away by rain. Efflorescence is reportedly reduced or eliminated, and spalling or cracking eliminated because there is no entrapped water to cause frost damage. Two coats, applied by brush or spray, are recommended by manufacturer. While coverage varies as to porosity of surface, 250 sq ft per gallon is considered average. Water resistant properties are normally realized within 6 hr. It is noted that the volatile solvents make practical application possible at 20 F. Clover-Leaf Paint & Varnish Corp.

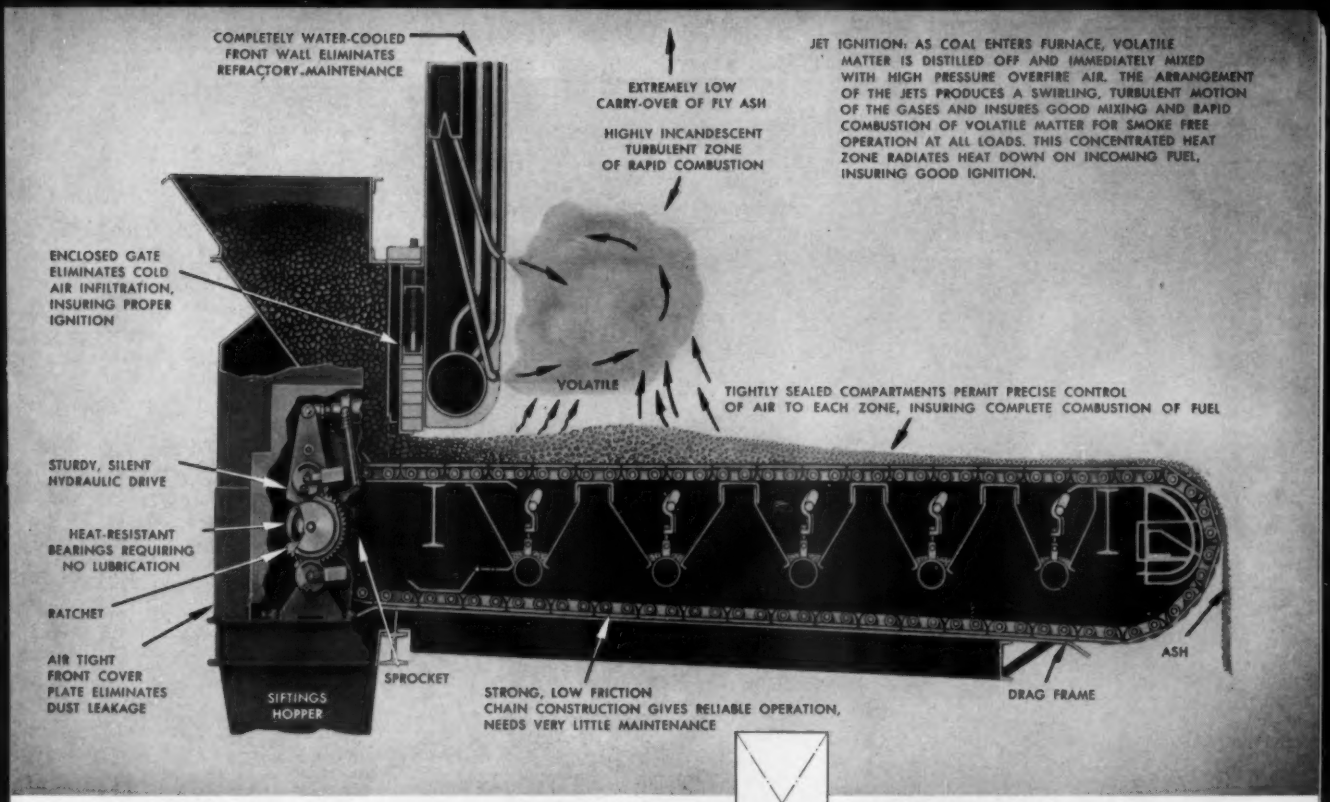
## 52—WALL SYSTEM utilizes standardized members

Narrow Line is a building front and wall system using a few standardized glass-framing members to provide broad freedom of design. The slender, extruded aluminum components feature putty-less, flush glazing throughout—on all four sides of a glass pane. There are built-in glass-holding channels in all components,



providing the appearance of glass panes flowing directly into the framework. (Glass stops may be used where flush glazing is not desired.) Narrow Line is planned for simplified, minimum-cost erection of glass-and-fixed glazing wall sections, entrances and display windows, interior vestibule work and partitions.

Vinyl plastic glazing used in this system is claimed faster to install than putty-held glass, neater in appearance and more resilient to pressure while providing a weather repellent seal. Flexibility is also emphasized for Narrow Line—the same components will act as frames for doors, permit glass to be set straight or at an angle, and accommodate glass sections around any angle of a building front. Also, the framing members can hold colored wall panels of other materials. Basic dimension of the vertical supports is only 1¾ in. wide by 4½ in. deep. The system lends itself to shop prefabrication or can be assembled at site. Kawneer Co.


COMPLETELY WATER-COOLED FRONT WALL ELIMINATES REFRACTORY MAINTENANCE
EXTREMELY LOW CARRY-OVER OF FLY ASH
HIGHLY INCANDESCENT TURBULENT ZONE OF RAPID COMBUSTION
JET IGNITION: AS COAL ENTERS FURNACE, VOLATILE MATTER IS DISTILLED OFF AND IMMEDIATELY MIXED WITH HIGH PRESSURE OVERFIRE AIR. THE ARRANGEMENT OF THE JETS PRODUCES A SWIRLING, TURBULENT MOTION OF THE GASES AND INSURES GOOD MIXING AND RAPID COMBUSTION OF VOLATILE MATTER FOR SMOKE FREE OPERATION AT ALL LOADS. THIS CONCENTRATED HEAT ZONE RADIATES HEAT DOWN ON INCOMING FUEL, INSURING GOOD IGNITION.
ENCLOSED GATE ELIMINATES COLD AIR INFILTRATION, INSURING PROPER IGNITION
VOLATILE
TIGHTLY SEALED COMPARTMENTS PERMIT PRECISE CONTROL OF AIR TO EACH ZONE, INSURING COMPLETE COMBUSTION OF FUEL
STURDY, SILENT HYDRAULIC DRIVE
HEAT-RESISTANT BEARINGS REQUIRING NO LUBRICATION
RATCHET
AIR TIGHT FRONT COVER PLATE ELIMINATES DUST LEAKAGE
SIFTINGS HOPPER
SPROCKET
STRONG, LOW FRICTION CHAIN CONSTRUCTION GIVES RELIABLE OPERATION, NEEDS VERY LITTLE MAINTENANCE
DRAG FRAME
ASH

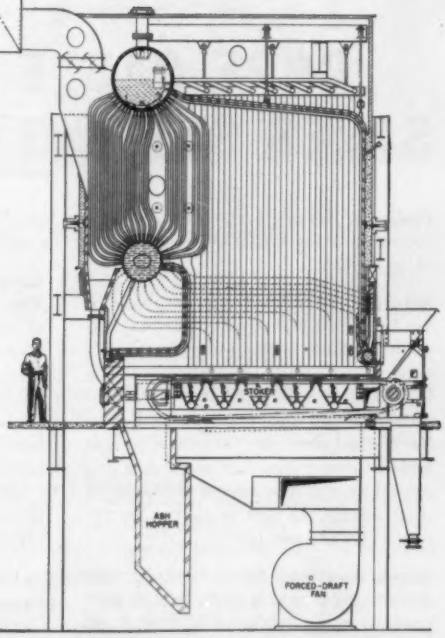
### Latest Unit at University of Rochester Will Burn High-Caking Coals

# B&W JET-IGNITION STOKER SELECTED TO SOLVE SMOKE AND FLY ASH PROBLEMS

Stable, efficient combustion over wide load ranges, without smoke and with extremely low fly ash, is achieved by the new B&W Jet-Ignition Stoker when burning bituminous and sub-bituminous coals—including high-caking and coking grades. The Jet-Ignition Stoker maintains a clean stack without using dust collectors.

**Selection** of a B&W Jet-Ignition Stoker for the University of Rochester was made to solve a community relations problem caused by smoke and fly ash. Dr. Lewis D. Conta, Chairman of the University's Division of Engineering, and George D. Haas, Chief Engineer, recommended installation of the unit after observing a commercial installation burning the high-caking coals used by the University.

**B&W Jet-Ignition Stokers** are another of the developments of B&W engineering and research, supported by nearly a century of experience in all phases of steam generation. If your problem is one of excessive smoking and fly ash emission, Bulletin G-85 will tell you how a B&W Jet-Ignition Stoker can help you. And for any problem in steam generation, B&W engineers are ready to help you and your engineers find the solution. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.




B&W Stirling Boiler with Jet-Ignition Stoker at University of Rochester, designed for 100,000 lb of steam per hr at 125 psi.

G-831-18

**BABCOCK & WILCOX**

BOILER DIVISION

**For more facts circle 621 on Reply Card**

*Each of the two illustrated troughs can carry as much cable as all of the paralleling conduit.*

# COPE CABLE TROUGH SAVES STEEL BY THE TON!

**Problem.** 100 miles of cable to be supported in a New Jersey power generating station.

**Solution.** A careful cost analysis of available methods and materials convinced plant engineers that Cope's expanded-metal cable trough was the best choice. Why? Among other reasons, it meant a saving of more than a ton of steel for every 60 feet of trough installed, as compared to conduit . . . a total saving in excess of 250 tons of steel for the 15,000 ft. of trough required for the completed job!

**Here's How You Save.** *One* 10 foot section of 24" width Cope trough supports as many cables as 16 lengths of 4" conduit and it only weighs 54 lbs., compared to 575 lbs. for this same amount of conduit. This adds up to real economy regardless of the size of your installation. Cope's expanded-metal cable trough simply uses *less* steel to do the job and obviously this can mean substantial savings for you!

**Cuts Labor and Maintenance Costs, Too.** Design and construction features of lightweight Cope trough speed installation of space saving systems—even in the most cramped quarters. Easy-to-get-at trough simplifies cable inspection and repair . . . provides ready re-routing and facilitates system additions.

You save *three* ways when you specify Cope cable supporting equipment . . . trough, ladder or channel.

- **LOWER FIRST COST**
- **LOWER INSTALLATION COSTS**
- **LOWER SYSTEM MAINTENANCE COSTS**

Discuss these advantages for *your* installation with a qualified Cope representative—or write to T. J. Cope Division, Rome Cable Corporation, Collegeville, Pa.

1009

**T. J. COPE** *Division*

ROME CABLE CORPORATION

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## Editor's Report on Great Britain

(Continued from page 101)

the dock can be pumped out in four hours, with four 54-in. vertical spindle centrifugal pumps. This 1200-ft-long concrete "tub" can dock a ship of 100,000 tons.

8. Bristol. Actually, I was in Filton, home of the Bristol Aircraft, where the Bristol Brittania is manufactured. This big, four-engine turboprop plane is rightly called "The Whispering Giant"; I stood near the runway when one took off, and I know.

S. E. Cammidge, Maintenance Engineer for Bristol, showed me the vast assembly areas used in the plane construction. As he put it, four football fields could be put into only one of the three buildings used in the main assembly areas. A fire during a reroofing job had burned up an acre of the roof, a few days before my arrival, but all was under control, and the cleanup had begun, when I arrived.

9. Coventry, after a brief stop overnight with Mr. and Mrs. Hadleigh Seaborne, in Knowle. Hadleigh is the General Secretary of I. Plant E., as well as its founder. At Courtauld's Ltd., in Coventry, Tom Adams, Chief Engineer of the Acetate Division, showed me how acetate fiber is made. Saw something new (to me) there.. a control panel for one of the chemical processes involved, on which all the pneumatic tubing was aluminum. A change, from the copper I'm used to seeing.

10. Back to London, to visit the Tate & Lyle sugar refinery on Plaistow Wharf. Sir Oliver Lyle, Managing Director, who had been a principal speaker at the I. Plant E. Conference, had arranged a day at the refinery with Frank Chapman, Technical Advisor. A talk with Maintenance Engineer John Pearson was a further "convincer" to me that British and American plant engineers are more alike than our distance separation would indicate. Case in point: the centrifuges used in the production of sugar are basically an American design, and John had only recently sent a questionnaire to American users of the equipment, asking their experience with various parts of the machine, as far as maintenance was concerned.

11. Edinburgh, where a proposed business-pleasure trip turned out to be primarily pleasure, thanks to Mr. and Mrs. George Sievewright. Another past president of I. Plant E., George (and his wife Agnes) presented Edinburgh to me as it should be done.. through the eyes of natives, proud of its history and anxious to share it with their overseas friends.

*in industrial lighting, this label stands for Quality . . .*

*you get its extra assurance on over 18,000 Benjamin Units!*

When you specify Benjamin, you never need to sacrifice the quality assurance of the RLM Label. With Benjamin you can get an RLM-Labeled Unit in practically every combination needed in modern industrial lighting. Any suspension, any lamp size, any reflector type, any accessory—you name it! In fact, RLM Standards form the engineering basis for every Benjamin industrial unit. Yet, our engineers strive to exceed these standards wherever possible thru the development of improved porcelain enameling, advanced lampholders, corrosion-resistant channels, etc. That's why, when you want "RLM-labeled quality fixtures," it pays to look first in the Benjamin Catalog! We'll be happy to send you our latest industrial lighting bulletins covering all RLM-labeled fixtures. Benjamin Electric Mfg. Co., Dept. PE, Des Plaines, Ill.

Today, the RLM Label on industrial lighting units stands for the highest quality specifications in RLM history. They cover greater upward light, higher reflection factors, more light output, and many other construction, design and performance characteristics.

**BENJAMIN**

*always the source of good lighting.*

R-181

**For more facts circle 623 on Reply Card**

# Everything's stacked in your favor with this full-slewing cantilever boom

Full selectivity allows stacking and grouping of dissimilar materials for conservation of yard space.

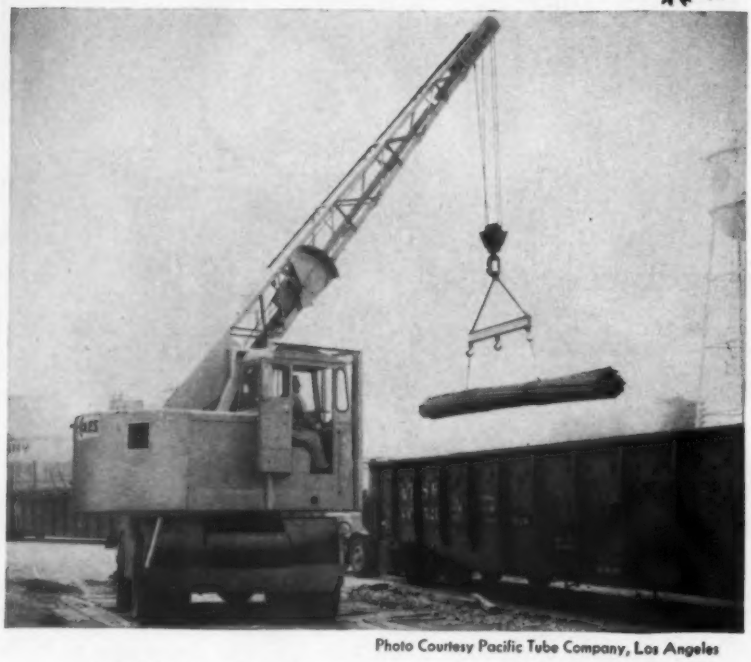

Photo Courtesy Pacific Tube Company, Los Angeles

Available L.P.G.-, diesel-, or gasoline-electric powered in capacities from 5 to 50 tons. Available on long-term lease arrangement, too. Write for new Coles fact-book, "101 Cost-Cutting Ways".

COLES

CRANES

JOLIET 10, ILLINOIS

For more facts circle 624 on Reply Card


## NEW PLANT CONSTRUCTION

(Continued from page 140)

for its Scintilla Division here. Division produces wide range of ignition products and electrical connectors.

**Syracuse, N. Y.**—Crucible Steel Co. of America, Oliver Bldg., Pittsburgh, Pa., plans a major expansion program at local site here of company's Vacuum Metals Corp. Expansion, expected to be completed by early 1958, will represent an investment of approximately $1.5 million.

**Akron, O.**—B. F. Goodrich Co., Industrial Products Division, 500 S. Main St., plans to construct a new plant, located on the main plant property, for the manufacture of adhesives. Plant will be a two-story structure with a floor area of approximately 70,000 sq ft. Work will get under way soon for completion late in 1958 at a cost reported to be $2.5 million.

**Toledo, O.**—Standard Oil Co. (Ohio), Midland Bldg., Cleveland, O., has announced plans for the construction of a new $40-million refinery facility at the Toledo plant. Work is already under way and is scheduled for completion by spring of 1958. M. W. Kellogg Co., Jersey City, N. J., is the construction engineer.

**Houston, Texas**—Maxwell House Division of General Foods Corp., White Plains, N. Y., has authorized a major expansion program at a cost of $6 million which will more than double its instant coffee making capacity here. In addition company proposes to build a caffein removal unit at this location. Warehouse and trucking facilities will be expanded and placed into operation by early fall.

**Orange, Texas**—Spencer Chemical Co., Dwight Bldg., Kansas City, Mo., has announced plans for a major expansion of company's production capacity. New facilities will produce conventional and medium density polyethylene by the high pressure method employed since the plant began operations in 1955.

**Pasadena, Texas**—Champion Paper and Fibre Co., Hamilton, O., will construct a new chemical recovery smelter and precipitator here. The smelter will recover chemicals, such as black liquor, used in conversion of wood into pulp and paper. Brown & Root, Inc., will do the engineering, and Constructors, Inc., Houston, Texas, the construction work. Total cost of the new facility will be approximately $2.5 million.

**Lampo, Utah**—Thiokol Chemical Corp., 776 N. Clinton Ave., Trenton, N. J., will construct eight new buildings at company's Lampo, Utah, complex. Included in the group are two processing plants reported to cost about $250,000 each and an administration building. Company is engaged in the manufacture and production of solid rocket propellents. Olsen Construction Co., Salt Lake City, Utah, will have charge of engineering the project.

# FREE

THIS 12" SAMPLE OF ALCOA ALUMINUM CONDUIT

## ALCOA RIGID CONDUIT IS EASIER AND MORE ECONOMICAL TO INSTALL,

### SAY CONTRACTORS

The contractors who installed the electrical system in Alcoa's 30-story office building and in every new Alcoa plant erected in the past ten years agree on this point.

> Aluminum rigid conduit installs easier, faster and at lower cost than any other!

Alcoa® Aluminum Electrical Rigid Conduit is easier to cut . . . easier to bend . . . easier to thread.

It weighs two-thirds less than steel . . . which makes it easier to handle, less costly to ship, easier to stockpile at job site.

From the long-range viewpoint, there are other savings:

> No staining or corrosion . . . and no painting
>
> Up to 20% less voltage drop
>
> Greater safety in hazardous locations . . . because aluminum is nonsparking

Alcoa Rigid Conduit has Underwriters' Laboratories approval. Suitable fittings are available. And adequate stocks are maintained throughout the country by Alcoa distributors.

Why not get all the facts on this timesaving, more profitable conduit? The coupon below will bring you complete literature and a generous sample.

**Aluminum Company of America**
**2330-G Alcoa Building**
**Pittsburgh 19, Pa.**

Please send literature on *Alcoa Aluminum Electrical Rigid Conduit* and a one-foot sample.

Name_____

Title_____

Company_____

Address_____

City and State_____

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PYLE-NATIONAL'S
NEW
CONNECTORS
for MILITARY-INDUSTRY
THAT MEET AND EXCEED PERFORMANCE REQUIREMENTS
OF CLASS A, B, C AND E
OF SPECIFICATION
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4 TO 100
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ask for
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CONDUIT FITTINGS • CIRCUIT CONTROLS • LIGHTING EQUIPMENT
SINCE 1897
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# NEW BOOKS

## for the plant engineer

### Work and Motion

**MOTION ECONOMY AND WORK MEASUREMENT by R. L. Morrow. Size 9¼ by 6¼ in.; 468 pp including index; illustrated; cloth bound. Published by the Ronald Press Company, 15 East 26th St., New York 10, N. Y. Price $7.50.**

THE FIRST EDITION of this book is known by the title of "Time Study and Motion Economy." The second edition, under the new title, is a concise and comprehensive treatment of motion economy and work measurement. It retains the practical approach of the first edition. In the book, emphasis is placed on techniques and their applications, but theory pertaining to the principles involved is included.

Fatigue in industry, time-recording equipment, leveling and rating, work sampling, union-management cooperation, straight line production, the standard data method, and feeds and speeds for the cutting of metal are some of the subjects treated in the book.

### Survey of Engineers

**ENGINEERS EMPLOYED BY PRIVATE PRACTITIONERS. Size 9 by 6 in.; 40 pp; paper bound. Published by National Society of Professional Engineers, 2029 K Street, N. W., Washington 6, D. C. Price $1.00.**

IN THIS REPORT there is basic information on: salaries, hours, geographic distribution of engineer employees, size of the consulting firms, fringe benefits, length of the workweek, and overtime pay practices.

The consulting firms surveyed ranged in size from those employing one engineer to those which employ as many as 300. The questionnaires returned represent data for a total of 6,407 engineers—employees of consulting firms and not owners or partners.

### Automation

**AUTOMATION IN BUSINESS AND INDUSTRY edited by E. M. Grabbe. Size 9¼ by 6⅛ in.; 611 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. Price $10.00.**

THIS PUBLICATION is based on lectures that were given during an engineering extension course at the University of California. It includes comments made by techinal people affiliated with various firms.

The book supplies considerable in-

# Why a STEEL BUILDING is your practical choice for a long-lasting, expandable warehouse

Steel buildings are ideally suited for reliable warehouses, offices, and manufacturing and storage buildings because they can be erected quickly and easily to give you the utmost in strength and durability.

They can be erected in standard sizes, then expanded whenever the need arises. All-steel buildings provide top protection against fire and bad weather. And from an economy standpoint they offer a double saving—no direct design expense plus low maintenance costs.

Factory-Built Steel Buildings, fabricated from USS Galvanized Steel Sheets with USS Structural Steel framework, are pre-engineered with standard materials. Foundation plans are simpler; erection is a matter of days. For details, write to United States Steel Corporation, Room 2831, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

UNITED STATES STEEL

USS

For more facts circle 627 on Reply Card

**Solve air quenching and production cooling problems**

**THIS MONTH**

**with "HY-V" AIR JETS**

"Hy-V" Air Jets can shoot a blast of cooling air up to 74 feet without ducts. Mount them high on walls or columns. Then fans can't be damaged by trucks . . . cords can't be cut by wheels. These fans can be depressed 45° and aimed left or right.

Use "Hy-V" Air Jets for air quenching extrusions and for cooling men exposed to heat from ovens, furnaces, forges or molten metal. Men become less fatigued, need less time out. And remember, hot weather is on the way. So start now to solve this problem. Mail coupon today.

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De Bothezat FANS

DeBOTHEZAT FANS DIVISION, Dept. PE-757
American Machine and Metals, Inc.
East Moline, Illinois

☐ Send bulletin with complete data on "Hy-V" Air Jets.
☐ Have a DeBothezat representative call.

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formation encompassing fundamentals of automation, new developments in automation techniques, etc.

Among the principal topics treated in this book are the following: basic concepts of industrial intrumentation and control; analog and digital computers; automatic production of electronic equipment; feedback control systems; economics of plant automation; and input-output equipment.

## Concrete Design

**BASIC REINFORCED CONCRETE DESIGN: ELASTIC AND CREEP by G. E. Large. Size 9¼ by 6⅜ in.; 527 pp including index; illustrated; cloth bound. Published by the Ronald Press Co., 15 E. 26th Street, New York 10, N. Y. Price $7.50.**

THIS PUBLICATION is a second edition of a textbook which has been brought up to date in its basic material and by the addition of chapters which cover important new developments. Much of the new material is devoted to fundamental treatments of creep and shrinkage.

The book contains examples based on fundamental considerations only, of the designing of combined stress members by the ultimate strength method, and includes experimental data on creep and shrinkage deformations and beam deflections.

Instructional examples, individualized problems, chapter summaries and discussion questions are provided in the book. Insofar as possible the latest American Concrete Institute Code is justified and its use explained on the basis of theory.

Some of the principal topics covered in the book are: buildings—design of them and girder floors, columns; continuity; two-day, and flat slab floors; footings; retaining walls; and prestressed concrete beams.

## Symbols for Metallizing

**STANDARD METALLIZING SYMBOLS (Tentative). Size 9 by 6 in.; 10 pp; illustrated; paper bound. Published by the American Welding Society, 33 West 39th St., New York 18, N. Y. Price $1.00**

SYMBOLS IN THIS publication result from the joint efforts of the American Welding Society's Committee on Metallizing and the Canadian Government Specification Board Committee on Metallizing.

The booklet covers: elements of a metallizing symbol; location of elements; surface preparation symbols to show extent of metallizing, thickness of coating, and method of finishing. There are also sample applications of symbols in the publication. In addition, a bibliography of other AWS standards and books is included.

## Do you worry about plant expansion wiring costs

# WHILE YOU'RE WAITING FOR A TRAIN?

If you're worrying about the costs of a new power distribution system — either in your present building or in that new plant you're planning — here's one way you can cut down on the worrying. Just specify Rockbestos A.V.C. (asbestos, varnished cambric insulated*) Interlocked Armored Cable. It will not only assure you of dependable service but will help you cut costs several ways. Here's how:

- Rockbestos A.V.C. Interlocked Armored Cable eliminates the need for costly conduits or ducts — it's easily installed on racks or hangers.
- Less layout time — less installation time mean important dollar savings.
- It permits planning for future installations — again at minimum cost.

Add to these direct cost-cutting advantages the long range economy of using a cable that gives you high current carrying capacity, that keeps maintenance at an absolute minimum and you can see the big savings possible when you specify and use Rockbestos A.V.C. Interlocked Armored Cable.

Get full details on dollar saving Rockbestos A.V.C. Interlocked Armored Cable — write now for complete specification and application data.

*Single conductors are N.E.C. type AVA

**ROCKBESTOS PRODUCTS CORPORATION**

NEW HAVEN 4, CONNECTICUT

NEW YORK, CLEVELAND, CHICAGO, PITTSBURGH, LOS ANGELES, DETROIT, ST. LOUIS, ATLANTA, DALLAS, OAKLAND, SEATTLE

# ROCKBESTOS

**A. V. C. Interlocked Armored Cable**

*For New Buildings, Expanding Existing Circuits, Relocating Old Circuits*

**For more facts circle 629 on Reply Card**

# Fact 1

Once in a while a better product is made, and made so well, that it becomes the standard by which all similar products are judged.

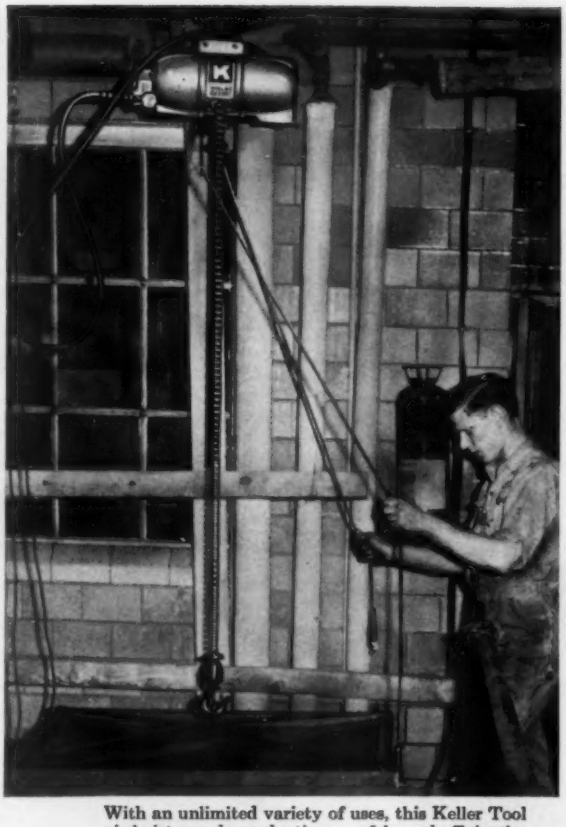
# Fact 2

The preference that you and millions of other users have shown for the RIGID Pipe Wrench puts on us the responsibility of keeping it always up to the top quality you expect of it.

The Ridge Tool Company, Elyria, Ohio, U. S. A.

For more facts circle 630 on Reply Card





With an unlimited variety of uses, this Keller Tool air hoist speeds production—safely and efficiently.

# Here's your "air lift" for 50- to 4000-pound loads

Wherever you have air power, compact Keller Tool air hoists provide a swift, steady lift—with gentle starts and accurate stops—for loads from 50 to 4000 pounds.

Stops and starts—day after day—won't cause motor burnouts that curb production. These hoists are powered by Keller Tool axial piston air motors that *can't burn out.*

Lightweight, relative to their lifting capacities, these handy air hoists are easy to move and install. All sizes are furnished with roller or link chain except 150-pound model, which is equipped with wire cable.

Check the table below for the capacity you need . . . then check with your Gardner-Denver representative or write for Bulletin 86.

| Model | Capacity | Speed | Weight |
|---|---|---|---|
| 86-2V40 | 4000 lb. | 10 f.p.m. | 100 lb. |
| 86-2V20 | 2000 lb. | 19 f.p.m. | 78 lb. |
| 86-2V10 | 1000 lb. | 38 f.p.m. | 78 lb. |
| 86-1V10 | 1000 lb. | 19 f.p.m. | 28 lb. |
| 86-1V5A | 500 lb. | 38 f.p.m. | 28 lb. |
| 86-1V3 | 300 lb. | 80 f.p.m. | 28 lb. |
| 86A-1 | 150 lb. | 45 f.p.m. | 14 lb. |

ENGINEERING FORESIGHT—PROVED ON THE JOB IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois

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**JULY, 1957**
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Your Company Name .....

Company Address..... City..... State.....

*(Company name must be given. If you prefer delivery at home, also fill below)*

Home Address..... City..... State.....

### PRODUCTS

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### BULLETINS

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| 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | |
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### ADVERTISED PRODUCTS, SERVICES

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JULY, 1957

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### ADVERTISED PRODUCTS, SERVICES

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| 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 |
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# BULLETINS

(Begins on page 21)

**161** **Industrial Casters, Wheels**—Catalog 125 contains 56 pp of illustrations, descriptions and specifications on hundreds of types and sizes of industrial casters. Included are swivel and rigid casters of forged steel, plate steel, cast steel, pressed steel and semi-steel—single and double wheel models; wheels—of steel, semi-steel, hard rubber, molded plastic; rubber tires—pneumatic, mold-on solid, semi-pneumatic, renewable; flanged track wheels, V-grooved wheels and cart wheels, bearings, and bearing seals. The Hamilton Caster & Mfg. Co.

**163** **Wire Rope Recommendations**—Bulletin DH-129-B, 16 pp, describes company's complete line of preformed wire rope, wire rope accessories, and cable assemblies. Contains data on construction features, applications, diameters, and pictures applications in construction by angle dozers, back hoes, back fillers, bulldozers; in cable ways, concrete mixers, hoists, cranes; in ditchers, draglines, drag scrapers; in scrapers, shovels, skimmers; in slings, slack-line excavators, trench hoes, wagons, winch trucks; as sway braces, back stays, others. Hazard Wire Rope Div., American Chain & Cable Co., Inc.

## HOSE AND FITTINGS

**164** **Flexible Hose, Bellows**—Sixteen-pp Catalog 156 describes applications and use of flexible metal hose and bellows. Engineering specifications and sizes, pressure ratings, materials and fitting attachments included. Detailed drawings and pictures facilitate specification of individual applications. Charts of the various metal-formed bellows and hose are provided. Flexonics Corp.

**165** **Flexible Metal Hose**—Catalog ID-100A is a 12-pp condensed catalog on flexible metal hose. An excellent reference book, it gives recommended pressures, temperatures and specific uses for which each type is suited. Various types are described and illustrated, including both seamless, corrugated type and interlocked type, with or without packing, as well couplings for each. Universal Metal Hose Co.

**166** **Water Suction, Steam Hose**—These two catalog sections describe company's lines of water suction and steam hose. Operating data and specifications on five types of water suction hose for industrial use are covered in one section. The second presents steam hose. B. F. Goodrich Industrial Products Co.

**167** **Hose Ends, Assemblies** — This 40-pp catalog incorporates detailed information on bulk industrial hose, permanently attached hose assemblies, swaged hose assemblies and ends, hose end swivel adapters, assembly instructions and installation data. Charts for hose agent selection, hose specifications and hose end identification are included, as well as data on maximum working pressure, proof-test pressure, minimum burst pressure, tube materials, reinforcement, temperature range and types of hose ends, and assembly instructions for reusable hose ends. The Weatherhead Co.

## HEATING, VENTILATING AND AIR CONDITIONING

**168** **Air Diffusion Equipment**—Catalog 1-57, 66 pp, describes and illustrates company's complete line of grilles and registers. Profusely illustrated with photos and dimensional diagrams, the book contains complete engineering data, including size selector chart and other selection information for each of the 26 standard sizes. Waterloo Register Co., Inc.

**169** **Radiant Heating Panels** — Advantages of Pyrex radiant heating panels are outlined in this 8-pp bulletin. Tells what radiant heating is and describes savings possible with this type of heating. Illustrations and data on sizes and wattage ratings are included. Corning Glass Works.

**170** **Utility Sets**—Bulletin 8414, 28 pp, describes company's HS utility sets, detailing features and advantages, and selection factors such as space volume, quantity of fresh air required, altitude and temperature correction, outlet velocity, duct size, static pressure. Tables of minimum outdoor air requirements, recommended duct velocities, outlet velocity and tip speed values for backward inclined blade fans and correction ratios for temperature and altitude included, also capacity tables. American Blower Div., American-Standard.

**171** **Air Conditioners** — Twenty-pp Bulletin 6125, on packaged air conditioners, describes 1957 models in 3- to 20-ton capacities. Design features are detailed and operating components discussed. Physical data for the units and major components are given. Engineering data provided includes capacity curves, fan performance tables, recommendations for V-belt drive selection for low, standard and high speed fan operation in each unit, pressure drop tables, etc. Also included are curves for finding amount of condenser water required. American Blower Div., American Standard.

**172** **Evaporative Condensers**—Eight-pp Catalog 311 illustrates and describes advantages of company's evaporative condensers designed to meet air conditioning, refrigeration, and industrial cooling needs. Included in the selection data are capacity tables, for both ammonia and Freon 12 and 22, as well as pump and blower horsepower data, engineering specifications, drawings, and dimension tables for all models. Acme Industries, Inc.

## MATERIALS

**173** **Commercial Glasses** — Several new glasses are included in the property data chart contained in 16-pp Bulletin B-83 on properties of selected commercial glasses. Among them are aluminosilicate glass, low loss iron sealing glass, fused silica, and radiotron tube and capacitor glass. Covers mechanical, thermal, electrical and chemical properties of glass, and includes viscosity temperature curves for several glasses, and heat transmission data. Corning Glass Works.

**174** **Plastics Fabrications**—This 14-pp illustrated bulletin offers information on industrial plastics fabrications. Features graphic examples of fabrication methods with illustrations of the types of products best suited to each method. An extensive chart, showing characteristics of tough, rigid thermo-plastics is also included. L. A. Darling Co.

**175** **Reinforced Plastics**—Believed the first complete catalog and price list for fiber glass reinforced plastics, this 14-pp book gives ranges of fiber glass fabrics and fibers, polyester and epoxy resins and catalysts, and other supplies. Lists cloths, tapes, chopped strand mats, surface and overlay mats, rovings, chopped strands and milled fibers. Also covered are polyester resins, epoxy resins and hardeners, peroxides, pigment paste dispersions, diluents, etc. Sizes, grades and prices are shown, along with properties. Cadillac Plastic & Chemical Co.

**176** **Sintered Carbides**—This series of Blue Data Sheets on Carmet carbide grades are keyed with bands of different colors across the bottom to indicate each grade's function. A red band at bottom indicates grades for machining steel; blue, non-ferrous and cast iron materials; green, die grades and wear uses, and yellow, for chrome carbide uses. Each sheet gives applications, analysis, physical characteristics and a photomicrograph showing grain structure of carbide powder. Charts give transverse rupture, electrical conductivity and other data. Allegheny Ludlum Steel Corp.

**177** **Asbestos Textiles** — Selecting asbestos textiles for any application or temperature range is simplified with this 16-pp reference manual. Products covered include tape, cloth, tubing, lap, roving, cord, wick, and rope—each shown with uses and appropriate pictures. Union Asbestos & Rubber Co.

On the facing page are postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

**178** **Synthetic Fiber Felts** — Chemical and thermal properties of synthetic fiber felts are described in Technical Bulletin MS-1-756. Samples and typical performance characteristics data are included. American Felt Co.

**179** **Adhesives and Plastics**—Leaflet 142 is an 8-pp technical paper on use of adhesives with reinforced plastics. Supported by tables, charts, and diagrams, booklet contains data on effect of temperature on tensile shear strengths; physical properties of foamed-in-place plastic "sandwiches"; peel strength of Kel-F laminate-to-steel bonds with epoxy room temperature curing adhesives; bond properties of printed circuit laminates. Includes detailed bibliography. Rubber & Asbestos Corp.

## Among New Catalogs Of Special Interest

**180** **Steel Sheet, Strip** — This 32-pp booklet on stainless steel sheet and strip has more than 20 tables, including a stainless steel finder, corrosion resistance of various stainless steels, fabrication properties, and weight tables per lineal foot in various gages and widths. Sections are devoted to selection of stainless steel grades and an industry index of applications. Allegheny Ludlum Steel Corp.

**181** **Solid Tires** — Sixteen-pp Catalog MR-457, on industrial solid tires, contains information on standard and special types, data on comparative performance tests, preventive maintenance recommendations for longer tire life, and size and specification data. Also outlines company's manufacturing facilities. A separate 20-pp booklet, contained in a pocket in this catalog, lists current specifications for many makes of lift trucks and serves as a reference in selecting proper type and size of solid tire for a plant's trucks. The Monarch Rubber Co.

**182** **Spray Booths** — In 36-pp Bulletin 1700 are described spray booths of many types, sizes and application, including custom designed units and those which can be erected with wrench and screwdriver. Selection information provided includes illustrated selector guide giving capsule descriptions of each booth, how it works and its primary uses. Catalog includes section dealing with factors to consider in selecting a spray booth—dimensions, type of work to be done, pertinent code requirements, others. The DeVilbiss Co.

**183** **On Lubrication Problems**—"Breaking Lubrication Barriers," Bulletin 110, is a 16-pp brochure covering the history and development of the Molykote line of molybdenum disulfide lubricants. Bulletin covers physical and chemical properties of compound as well as providing charts which show its superior lubricity. Selection table, application photos are included, as well as a section on bonded solid film lubricating coatings. The Alpha Molykote Corp.

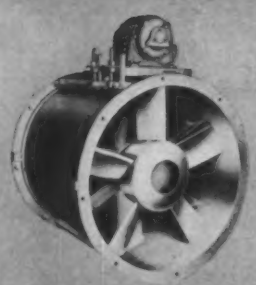
**184** **Concrete Handling Ideas** — "Effective Ideas for Handling Concrete Products," a 26-pp pocket-size booklet, gives practical tips on use of industrial trucks and attachments. Pictures show techniques for handling of block, pipe and precast products. Attachments are shown in manufacturing process such as aggregate and form handling and concrete pouring. Hyster Co.

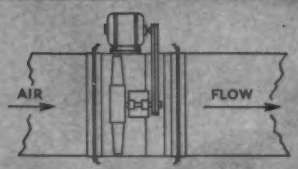
## BOILERS, ACCESSORIES

**185** **Steam Generators**—Bulletin B-56-5, 68 pp, covers steam generating equipment for large central station and industrial installations of all types, including reheat and dual circulation. Profusely illustrated with drawings of typical installations, the bulletin includes data on coal, oil and gas-fired units; descriptions of pulverized-fuel systems, burners, drum internals, reheaters, superheaters and other accessories. Foster Wheeler Corp.

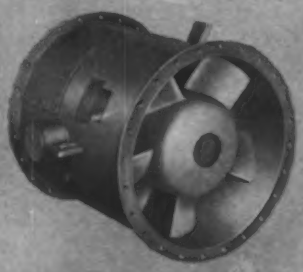
**186** **Self-Contained Boilers** — Bulletin AD-162, 8 pp, describes company's complete line of self-contained boilers for heating and processing steam or hot water. Design features and advantages are detailed and a cutaway view showing flow of air in the forced draft system is included. Cleaver-Brooks Co.

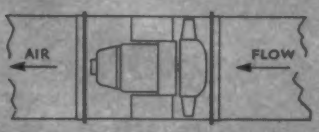
## Large Volumes of Air-- with Low Power Consumption



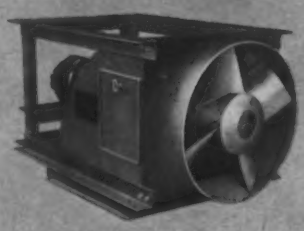


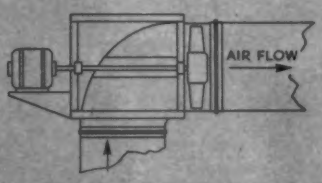

WINGFOIL Straight-Line Duct Fan forms part of run of duct. V-belt drive through air tube. Motor on adjustable platform is outside air stream. Sizes: 21" to 60". Capacities to 95,000 CFM, pressures to 2" s.p.






WINGFOIL Vaneaxial Duct Fan. Direct connected motor inside casing. Motor is totally enclosed with sealed bearings. Sizes: 10" to 42". Capacities on application.






WINGFOIL Elbow Type Duct Fan forms elbow in duct system. Strong rectangular frame. Motor outside air stream. Direct or V-belt drive. Mount in any position. Sizes: 10" to 60". Capacities up to 85,000 CFM, pressures to 2" s.p.

**WINGFOIL DUCT FANS** are your best bet, because of their strong, light-weight, rugged design, and the highly-efficient Wingfoil axial flow fan, which delivers high air volumes against static pressures with remarkably low power consumption.

The three types of duct fan, shown above, come in a wide variety of sizes and capacities. They are designed to handle hot or cold, dust-laden or corrosive air or gases and for exhausting or supplying air. *Write for Bulletin. Use the coupon.*

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Firm.....
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City.....Zone.....State.....

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# BULLETINS

(Begins on page 21)

**187** **Boiler Cleaning** — Bulletin 137A describes company's vacuum cleaning equipment for removing soot from boiler tubes. In addition to describing vacuum producers, soot separators, vacuum tools, and a portable vacuum cleaner, the bulletin includes a diagram illustrating modification of a central cleaning system for removing soot, scale and dirt from boiler tubes, stack bases and breech. The Spencer Turbine Co.

## MORTAR, FIREBRICK

**188** **Cement Mortar Manual**—"Lumnite Cement Mortar Manual—Gun Applied Linings—Masonry" is a 26-pp catalog on mortar preparation, placing procedure, and general instructions for gun-applied linings in oil refineries, power plants, metal and similar industries. An appendix contains information on selected aggregates, thermal conductivities of Lumnite concrete, and strength curves. A bibliography on refractory concrete is included. Universal Atlas Cement Co.

**189** **High Temp Mortars**—Bulletin 600, 6 66, offers detailed information on high temperature refractory mortars. Illustrates tests and applications as well as products, providing general and technical data on 11 regular and special grade mortars available. J. H. France Refractories Co.

**190** **Guide to Firebrick**—Bulletin 551, 8 pp, describes company's complete firebrick, high alumina and special Corindon brick for applications in boilers, incinerators, iron and steel furnaces, cement and lime plants, glass furnaces, pulp and paper plants, ceramic furnaces and others. Technical data, pyrometric cone equivalents, fusion points, hot load strengths, linear change, panel spalling loss, porosity and average chemical composition of various brick types included. J. H. France Refractories Co.

## OTHER EQUIPMENT

**191** **For Efficient Storage**—Bulletin 281, 12 pp, describes company's line of steel products, including shelving uprights, shelves, shelf brackets, shelving parts, and shelving sections. Photos and diagrams illustrating design features and dimensional details are included. De Luxe Metal Furniture Co.

**192** **Pressure Test File**—This technical file on pressure testing air-, gas- and liquid-tight vessels or assemblies at pressures to 1500 psi is available complete with picture index, illustrations and detailed information on design and selection of test plugs and filling connectors for sealing openings and adapting pressure lines. The file serves as a working guide for plant engineers concerned with sealing virtually any type of hole for pressure testing. Mechanical Products Corp.

**193** **Cooling Towers**—Bulletin CT-57-1, 32 pp, describes induced-draft counterflow cooling towers. Lists advantages and describes construction and operation of all major parts, effects of recirculation and surroundings. Profusely illustrated with photos, drawings and charts, the bulletin also includes data sheet. Foster Wheeler Corp.

**194** **Heat Exchangers**—This 16-pp revised catalog presents data on shell and tube heat exchangers for wide range of process, refinery and power plant application. Bulletin features an engineering section giving practical suggestions on determining heat exchanger requirements. Space is also devoted to thermal standards and reference data, and information on floating head, removable bundle included. Condenser Service & Engineering Co., Inc.

**195** **Staplers and Tackers** — Packed with photos and illustrations, this 28-pp book contains full information on Duo-Fast manual and air-operated stapling and tacking equipment. Applications in 16 basic industries—furniture, automobile, building, packaging, woodworking, and others—are detailed. Model numbers, type of staples that may be used, and special features are among the data furnished for each model and type of equipment. Fastener Corp.

**196** **Steel Pre-Fabs**—Prefabricated steel and aluminum buildings, from large to small, are

# Tuffy® Slings Give Steel Mill Twice the Service of Ordinary Slings

"We are getting twice the service life from our 1¼-inch Tuffy Slings as we did from 6x37 type slings."

This testimonial from a giant steel corporation says more for the quality and dependability of Tuffy Slings than we could tell you in any other way!

The secret of Tuffy's longer life is Tuffy's exclusive, patented, braided construction. This machine-braided fabric combines super strength with extra flexibility.

### It's Almost Impossible to Kink a Tuffy Sling. Try It!

Even if you succeed in kinking a Tuffy Sling with the help of a vise, you can straighten it out with no material damage to the fabric. Tuffy's resistance to knotting, kinking and looping is just one reason why Tuffy Slings can give you double the service of ordinary slings. Now let's take a look at the Tuffy ferrule:

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Applied under tremendous pressure, the steel ferrule literally flows into every space between the wires and strands. The friction force created gives the eye splice full strength of the sling fabric.

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He's ready with your Tuffy Slings and Union Wire Rope needs. Get in touch with him now!

**Get Your FREE Tuffy Sling Handbook**

Gives full data on Tuffy Sling types, dimensions, weights and rated loads. Plus a complete rigger's manual and engineer's notebook on wire rope constructions and specifications. Write for copy now!

HOT and HEAVY — this huge ladle is "handled with care" by a 1¼" Tuffy Sling and two 1⅛" Tuffy Hoist Lines. The load is 125 tons of molten steel being poured into the furnace.

**union Wire Rope corp.**

*Specialists in high-carbon wire, wire rope, braided wire fabric, and stress-relieved wire and strand.* (4)

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# BULLETINS

(Begins on page 21)

presented in this 8-pp bulletin. Fundamental advantages of prefabricated metal buildings and construction details are explained and typical views are shown. The H. L. Vokes Co.

**197** **For Cement Mill Service**—Included in this 24-pp bulletin on products for cement mill service are selection tables to aid in obtaining right chain, buckets, bucket spacing, head shaft wheel diameter and rpm, foot shaft sprocket and size and casing size. Drive selection data is also included. Steel chains, sprockets, buckets, gravity take-ups, bearings and drag chains are pictured and described. Also provided is information on belt conveyor idlers and pulleys and apron feeders. Chain Belt Co.

**198** **Closed-Circuit TV** — This 8-pp Quick Reference Catalog covers company's line of industrial television products, including cameras, monitors, lenses, cables, connectors and other accessories. Product descriptions, illustrations and specifications are included. Allen B. Du Mont Laboratories, Inc.

**199** **Industrial Ovens, Dryers**—Bulletin 157, 16 pp, illustrates and describes industrial ovens for baking, drying, curing and heat treating. For easy reference, it contains sections describing batch type ovens, conveyor type ovens, air recirculating and heating systems, and control and safety equipment. Illustrations of typical installations are identified by descriptive captions listing type of oven, process and product involved. Young Brothers Co.

**200** **On Felt Filtration**—Data Sheet 18 is an 8-pp technical presentation of the advantages of company's felt for liquid filtration. These felts are suited for use on plate and frame, pressure leaf, rotary vacuum, cartridge or specialty filters. Physical properties and performance characteristics are tabulated, and two charts correlate air or liquid flow rates for filtration of fluids of a known viscosity and stability of a typical felt in terms of tensile strength retained at high temp operating conditions. American Felt Co.

**201** **Valveless Filter** — Operation of company's automatic valveless filter is described in this 8-pp illustrated bulletin. Applications and typical operating conditions are detailed and diagrams included. The Permutit Co.

**202** **For Noise Control**—This 8-pp bulletin illustrates, with charts and photos, applications of pneumatic mufflers for elimination of exhaust noises of air-operated equipment. Charts show performance data in frequency and attenuation levels in decibels, loudness and attenuation levels in sones, air flow CFM, noise levels and attentuation levels at various airline pressures. Three inserts with additional data included. Allied Witan Co.

**203** **Hiring Scientifically?**—Tests and other materials for use in personnel selection and training are described in the 1957 edition of this organization's industrial catalog. Although aimed at personnel men, the catalog should be helpful to plant engineers concerned with employee selection. Suggests materials to be used in selecting employees, improving their performance and reducing turnover. Tests described cover intelligence, interest, personality, aptitude. Science Research Associates.

**204** **Marking Systems**—Of particular interest to those concerned with addressing multiple shipments, this 16-pp booklet illustrates and describes seven modern systems for fast, low cost addressing of labels, tags and cartons. Each system idea is described, with photos and drawings. Booklet also features a flow chart showing how integrated shipment addressing works. Weber Addressing Machine Co., Inc.

**205** **Humidifying System Parts**—Proper selecting and obtaining of all components required in an industrial humidifying system is the subject of Bulletin 82. It illustrates and describes nozzles, nozzle assemblies, float boxes, humidistats, solenoid operated valves, and all other required components. Included is information on humidifying units for easy installation in smaller rooms. Spraying Systems Co.

# DATA FILE of literature for the plant engineer's library

**STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided you on pages 213-214.**

## CONSTRUCTION

**301** **Aluminum Building Products**—Form AD 285 is a 32-pp catalog covering company's line of aluminum industrial building products. Cites advantages of aluminum, pictures some installations. Installation data, weights, dimensions and roughing-in details are provided on corrugated roofing and siding, V-beam roofing and siding, ribbed siding sheet, perforated corrugated sheet, flat flashing sheet. A discussion on sandwich wall system is presented. Aluminum Co. of America.

**302** **Partitions and Walls**—Low cost sound-absorbing partitions and walls designed for movable and flexible office enclosures are featured in this illustrated bulletin. Dimensional diagrams and specifications are included, as well as photos of typical installations. GR Products Inc.

**303** **Standardized Construction**—This 28-pp illustrated catalog on company's system of standardization in building construction presents a description of "F" buildings, a versatile series of flat-roof structures. Also features rigid-frame "A" series, offering clear spans of 100 ft and over; "B" series, center-column buildings where large clear spans are not required; "C" series, clear spans with crane runways. Luria Engineering Co.

**304** **Replacement Glazing**—Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties of this sheet. Plastic Dept., Rohm & Haas Co.

**305** **Steel Floor Plate**—Skid resistance and other advantages of multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, weights, data on allowable loads. United States Steel Corp.

**306** **Non-Slip Flooring**—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features; gives fabricating data. Alan Wood Steel Co.

## MATERIALS HANDLING

**307** **Electric Hoists**—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data, specifications included. Wright Hoist Div., American Chain & Cable Co., Inc.

**308** **For Overhead Handling** — Booklet 2008-M, 12 pp, is replete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track sections are included. Among subjects covered are various carriers for hand, electric and automatic operation; tractors; track switches; standard cranes, transfer cranes and gantry cranes; safety electrification; buckets and grabs. Cleveland-Tramrail Div., The Cleveland Crane & Engineering Co.

**309** **How to Choose a Crane**—Designed to aid in the selection of overhead cranes, 8-pp Unit 79 shows how to analyze handling problems, decide on the type of crane desired and draw up specifications for crane proposals. Basic data is provided on classes of crane service, crane ratings and capacities and recommended speeds for bridge, trolley and hoist, along with standard dimensions and clearances. Gives 14 safety features. Whiting Corp.

**310** **Transit Crane**—Twelve-pp Bulletin 15-B-TC-1 describes a transit crane of 15-ton capacity. Illustrated by job application photos and closeups of mechanical features, the booklet includes a list of specifications and working ranges, plus brief, easy-to-read description of the machines, advantages. Bucyrus-Erie Co.

**311** **Overhead Dispatch System** — Form F 192, 8 pp, describes an automatic overhead dispatch system designed to solve a variety of materials handling problems. Outstanding advantages are listed and typical installations are described and illustrated with detailed diagrams. Component equipment utilized in this system is individually illustrated and described. Richards-Wilcox Mfg. Co.

**312** **Electric Hoist**—Bulletin 158, 12 pp, describes outstanding features of company's heavy duty version of the small electric hoist. Includes photos, cutaway view of electric brain, diagrams, and full specification data. Also covers accessory equipment. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

**313** **Steel Conveyor Belts**—"A profitable approach to the selection of steel processing conveyor belts" is the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information are included. Photos and diagrams illustrate the text. The Colorado Fuel and Iron Corp.

**314** **Conveyor Belt Chart**—Engineering data for standard conveyor belt construction is given in this chart and accompanying sheet. Strength characteristics of eight popular ply and material combinations of conveyor belt constructions are provided. Each property is printed on the chart in a different color to facilitate comparison. Quaker Rubber Corp., Div., H. K. Porter Co., Inc.

**315** **Handling Cost Cutter**—Bound in loose-leaf style, the Materials Handling Cost Cutter tells how mechanized materials handling can cut handling costs in a variety of jobs and industries. Case histories of actual applications are cited, equipment and methods described, and a list of trucks and attachments "keyed" to the particular job and field. Profusely illustrated, catalog includes a section on industrial truck specifications. Automatic Transportation Co.

**316** **Load Handling Equipment** — Bulletin 406, 24 pp, covers company's Budgit, Tugit and Load Lifter products and other load handling specialties. Catalog numbers, sizes and specifications are tabulated, and application photos of the various products are included. Complete specifications and principal dimensions tabulated. Manning, Maxwell & Moore, Inc.

**317** **Cost-Cutting Materials Handling**—"The How Book of Cost-Cutting Materials Handling," is a 24-pp booklet covering various phases of the materials handling problem and their effect on industrial production. Text and pictures cover such subjects as fundamental handling motions, advantages of planned material handling practices, analysis of handling organization, collecting handling data, diagramming route of travel, and the use of particular materials handling equipment. A "Vis-O-Graf" summary on procedures to check efficiency of system included. The Yale & Towne Mfg. Co.

**318** **Adjustable Ramps**—Engineering details and other information on use and installation of company's hydraulic adjustable ramps for loading docks are featured in this illustrated bulletin. Two types of dock equipment are treated—the Adjust-A-Dock, installed in the loading platform or at its level, and the Adjust-A-Truck, installed at ground level to raise or lower rear wheels of truck. Rowe Methods, Inc.

**319** **Oil-Hydraulic Lifts** — Catalog RE-203, 20 pp, covers the field of heavy-duty oil-hydraulic lifting devices for industrial applications. Featured in catalog are company's standard Levelator lifts, a 6000 lb single-jack model and a 12,000 lb dual-jack lift. Also featured is

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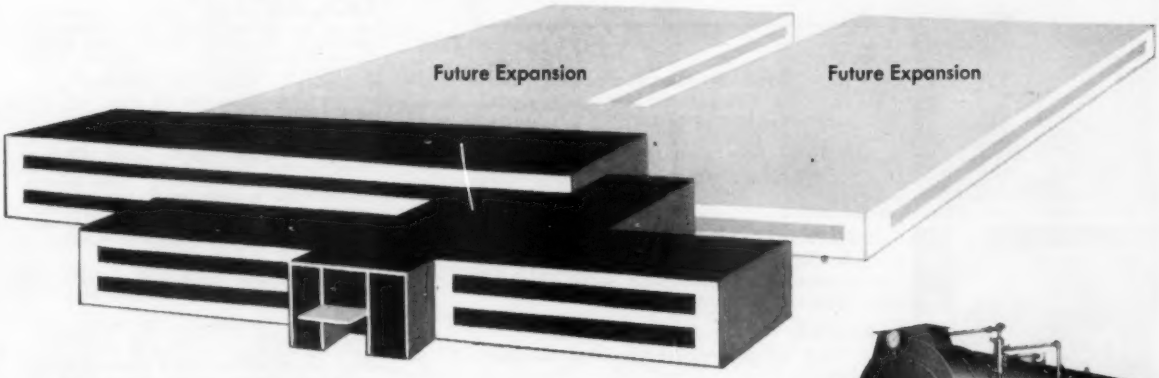


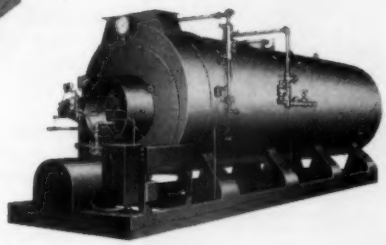

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## AS YOU NEED THEM!

With Cyclotherm Steam and Hot Water Generators you can plan your steam generating facilities to cover five — ten — fifteen years of plant expansion. Perhaps one 500 HP Cyclotherm will meet your present requirements. If you need 600 HP in 1958 — add a 100 HP Cyclotherm. If 200 more HP is needed in 1959, a 200 HP Cyclotherm will give you ample — *but not excess* — capacity. You buy as you grow — you pay only for what you use.

Only Cyclotherms lend themselves perfectly to a *progressive* increase in steam capacity. You can get them in 17 sizes — add units ranging from 18 to 750 HP. They're installed easily — need no stack, no excavation, no special foundation. A battery of Cyclotherms is easy to accommodate — a Cyclotherm takes up to 1/3 less space than even other package boilers. Completely factory assembled, too — set one down and with five simple connections it's ready to work.

Cyclotherm's Cyclonic Combustion guarantees plus 80% efficiency in only two passes. Larger units operate at from 30% to 100% of rated capacity without loss of efficiency — smaller units operate on and off automatically as load requires. Maintenance costs drop from 30% to 50%. And Cyclotherm's world-wide service-facilities are always at your disposal. For full information, write us today.

***Swan Rubber Did It — So Can You!***

Swan Rubber Co., of Bucyrus, Ohio, world's largest maker of garden hose, installed an 80 HP Cyclotherm in 1949. As Swan expanded, it installed:

| | |
|---|---|
| 1951 | 100 HP Cyclotherm |
| 1953 | 100 HP Cyclotherm |
| 1954 | 125 HP Cyclotherm |
| 1955 | 125 HP Cyclotherm |
| 1956 | Two 500 HP Cyclotherms, one 125 HP Cyclotherm. (Built additional plant in 1956) |

And Swan plans to install during 1957 another 500 HP, another 125 HP and a 30 HP Cyclotherm. In 1949, Swan planned for the future with Cyclotherm. You can plan for your future with Cyclotherm today.

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Please send me your booklet *Cyclotherm Cyclonic Combustion*, also rotogravure copy of *Cyclotherm Sales Steam* with illustrations and descriptions of Cyclotherm installations.

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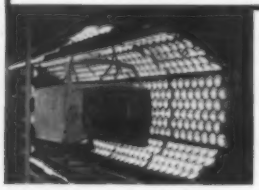
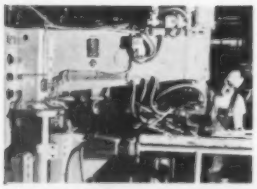
GENERAL ELECTRIC

# VOLTAGE REGULATION PHOTO QUIZ



**QUESTION:**
In infrared drying ovens, what causes scorching or lengthens baking cycle while shortening lamp life?

**ANSWER:**
"Bad Voltage"—over or under lamp rating.



**QUESTION:**
In electronically controlled machines, what causes excessive rejects, down-time and high maintenance costs?

**ANSWER:**
"Bad Voltage"—over or under nameplate rating.

**QUESTION:**
What makes electroplating equipment produce poor plate quality, high rejects?

**ANSWER:**
"Bad Voltage"—over or under nameplate rating.

**QUESTION:**
What causes electronic computers to give wrong answers, requiring costly down-time and high maintenance?

**ANSWER:**
"Bad Voltage"—over or under nameplate rating.

**QUESTION:**
What is the most economical way to eliminate bad voltage?

**ANSWER:**
An Inductrol* Voltage Regulator, which precisely controls either a-c or d-c voltages. Three types available: motor-operated, hand-operated, automatic (shown left). Has excellent space factor, easy to install, neither affects nor is affected by system power factor. Since it is an induction regulator, it has no brushes, needs essentially no maintenance. Highly reliable.

**FOR MORE INFORMATION** contact your G-E apparatus representative, or write Section 425-9, General Electric Co., Schenectady 5, N. Y.

*Trademark of General Electric Company for Induction Voltage Regulators.

*Progress Is Our Most Important Product*

GENERAL ELECTRIC

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# DATA FILE

(Begins on page 218)

an electric pump mounted on an oil tank for powering oil-hydraulic devices. Illustrates lift platforms, platform accessories and safety devices, jacks, power units. Rotary Lift Co.

**320** **Electric Freight Elevator**—Bulletin A-414, 12 pp, contains design and operation information on company's plunger electric freight elevator designed for low-rise, light and heavy duty freight handling requirements. A sectional diagram points out component parts, and an installation diagram and size and capacity table are included. Otis Elevator Co.

**321** **Casters and Wheels**—Catalog 138 is a 191-pp product manual on company's line of casters and wheels, describing design features and listing full specifications. Photos and drawings are used profusely to illustrate data, covering furniture casters, wheels, glides, desk shoes and various accessories. Darnell Corp.

## SLINGS, WIRE ROPE

**322** **Sling Handbook**—The 64-pp Tuffy Sling Handbook is replete with illustrations, charts and diagrams describing 16 factory fitted slings and nearly two dozen standard fittings available for slings, including several which are recent additions to the line. Book contains a complete rigger's manual, shop chart of ratings, an engineer's notebook and standard signals for directing operations of overhead traveling cranes and derricks and locomotives. A new development featured is the steel ferrule splice now on Tuffy slings. Union Wire Rope Corp.

**323** **Preformed Wire Rope**—Stainless steel and monel metal preformed wire rope is described in this informative bulletin. Constructions of different type of wire rope are illustrated, typical uses are listed, and engineering information such as breaking strength in pounds per 100 ft is charted. Macwhyte Co.

## MAINTENANCE

**325** **Basic-Roofing Information**—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of good re-roofing job. Johns-Manville.

**326** **Painting with Aluminum**—This helpful booklet describes advantages of aluminum paints, describes three basic types for non-absorbent surfaces, for weather-exposed wood, and for heated surfaces and those not exposed to weather. Typical maintenance applications are covered in text and picture, and practical suggestions for good results included. Aluminum Company of America.

**327** **Guide to Corrosion Prevention**—How Bitumastic protective coatings aid in fight against corrosion is told in this 12-pp booklet. Discusses corrosion as a universal industrial problem, role of protective coatings in cutting costs and lengthening service life of structures and equipment, and gives data on several coal-tar-based coatings intended to solve a variety of corrosion problems. Twelve typical case histories covering use of these coatings in varied industries described. Koppers Co., Inc.

**328** **Insulation Coating**—This 32-pp illustrated handbook, Form L-17, presents the advantages of company's NoDrip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster or composition surfaces. Lists applications and describes methods of applying. Contains tabulated data on quantity required to cover various size tanks and pipe. J. W. Mortell Co.

**329** **Guide to Maintenance Products**—Catalog 56, 48 pp, on industrial maintenance paint products lists specialized coatings to resist alkalies, acids, oils, grease, moisture. A complete buyers' guide, this book includes, besides maintenance coatings, waterproofing, roof coatings, caulking compounds, floor patching materials. Gives technical information on paints for wet walls in food processing plant; epoxy resin coatings offering high resistance to strong acids and chemical salts; a rust inhibitive paint for

# you save money SEVEN WAYS with longer, stronger AMVIT Clay Pipe

*Outstanding Mechanical Joint*
*on pipe 4 feet long or over*
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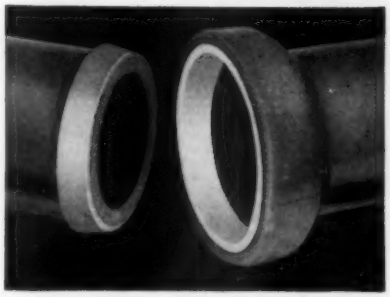

More than 200 major installations have been completed with outstanding results since Amvit Jointed Clay Pipe was introduced in 1955.

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No other materials such as caulking, joint compound, hot pots, or ladles are needed to make the Amvit joint. The joint is on the pipe delivered to the job ready for use. Just push the pipe together and the joint is complete.

**2. IMMEDIATE BACKFILLING**

You can backfill as soon as the line is completed. Barricades can be removed and streets opened days sooner.

**3. QUICK TESTING**

No need to wait days to see if a line has passed test. A look at the completed joint will tell. Thus, engineers can inspect and accept the line allowing the contractor to receive payment quicker.

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Field tests from completed installations show that infiltration can be definitely controlled. Engineers can, thus, reduce infiltration specifications, use smaller diameter pipe and save in material cost.

**5. ROOT PROOF**

Amvit is a compression joint on the ball and socket principle. The surfaces of both bell and spigot are in uniform compression preventing root penetration.

**6. BETTER FLOW, LESS MAINTENANCE**

The design of the joint assures that the pipe is self-centered at all times. This gives perfect alignment and self-cleansing. Because the joint is really tight, no foreign matter such as dirt, sand and stones can possibly enter the line.

**7. COMPLETE FITTINGS**

Amvit is furnished on all standard fittings, as well as pipe. This will permit a uniformly tight line from house wall to treatment plant.

Amvit Jointed Clay Pipe, in sizes 4" through 24" together with all fittings is available for immediate delivery in the Northeast and Central States.

For more information on how Amvit can help cut your sewer project costs, write or call American Vitrified Products Company, National City Bank Building, Cleveland, Ohio, or our office nearest you.

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AMERICAN

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CLEVELAND OHIO

MANUFACTURERS OF: Clay Pipe, Flue Liners, Clay Liner Plates and Concrete Pipe.

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**For more facts circle 636 on Reply Card**

# DATA FILE

(Begins on page 218)

iron and steel surfaces and a fast-drying floor coating. Steelcote Mfg. Co.

**330** **Guide to Coatings**—This 1957 Coatings Manual is a 32-pp treatise highlighting the stopping and preventing of rust on nearly all types of rustable metal. Illustrated in full color, this book contains information and recommendations to enable accurate determination of specific coatings needed for the job. Basic principle of Rust-Oleum's fish oil penetration into pores of metal is illustrated. Application photos give new ideas for protecting girders, tanks, boilers, roofs, other surfaces. Over 100 color chips show colors available in primers, short-oil and long-oil coatings. Galvinoleum, heat resistant, chemical resistant, and floor coatings are covered. Rust-Oleum Corp.

**331** **Paint Work Book**—Bulletin 760, about 12 pp, is a practical manual giving painting data in charts, tables, diagrams and illustrations. Factors relating to use of company's protective coatings in mild to severe corrosive service are covered. Coatings and related primers are presented, along with surface preparation, priming application methods and maintenance instructions. Care and cleaning of brushes and spray equipment is explained. The U. S. Stoneware Co.

**332** **Protective Paint**—Thirty-five case histories of successful use of protective coatings based on chlorinated rubber are included in this 20-pp bulletin, "Protection With Parlon." Photos show water and sewage tanks, and chemical and food processing plants where these coatings have had long-term exposure to corrosive environments. Hercules Powder Co.

**333** **Floor Surface Hardener**—Bulletin SH56 describes preparation of Emeri-Topcrete, a hard surface flooring made with company's Type SH Cortland emery aggregate. Includes recommended specifications and estimating data. Materials, mixing, application and curing information is given. Walter Maguire Co., Inc.

**334** **Better Floor Care**—This illustrated folder describes products designed to aid efficient floor care. Lists combination Scrubber-Vac machines, conventional scrubbing-polishing machines, steel-wool pads, applicators, vacuum cleaners, mop trucks and other mopping equipment. Included are waxes, sealers and cleansers. Finnell Systems, Inc.

**336** **Tough Floor Topping**—Chemi-Top, a corrosion resistant floor topping for food processing, chemical and other plants having severe floor corrosion problems, is discussed in 8-pp Form A515R. What Chemi-Top is, and what it can do, are explained. Two basic formulations and three service types are covered, also a non-skid type for maximum slip resistance. The Garland Co.

**337** **Light Scaffolds**—This series of illustrated bulletins describes company's line of aluminum alloy Up-Right scaffolds and accessories. Pictures one-piece sections and multi-section models with various ranges of adjustability. Points out such features as locking hooks which provide automatic security and locking casters for safety on stairways and inclines. Up-Right Scaffolds Div., Up-Right, Inc.

## STORAGE EQUIPMENT

**338** **Adjustable Shelving**—How this shelving can save assembly time is explained in 28-pp Form 2111. Photos and drawings of various types of shelving units, including open and closed shelving, bin units, ledge shelving, counter shelving, cabinets with swinging and sliding doors, parts and accessories are included. Standard Pressed Steel Co.

**339** **Storage Equipment**—Catalog 100-E, 72 pp illustrates and describes company's complete line of steel cabinets, folding chairs, chests and safes, stools, tool boxes, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, revolving bins, others. Includes dimensions and other specifications. Photos illustrate some typical equipment installations. Lyon Metal Products, Inc.

**340** **Storage Shelving**—Rapid erection, strength and other advantages of manufacturer's storage shelving are stressed in this illustrated bulletin. Shows component parts, open types, closed types and some of the many combinations of dividers, bins, doors available. Also presents tool inserts, other shop equipment. DeLuxe Metal Furniture Co.

## ELECTRICAL

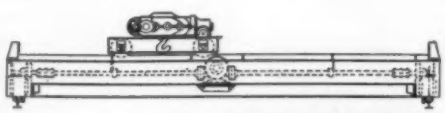
**341** **Motor Buying Tips**—Bulletins GEC-1062A and GEC 1027A, each 11 pp, give buying information on a selected group of this manufacturer's motors. Included are application data, ratings and prices for fractional horsepower motors, integrel-horsepower polyphase and single phase induction motors, motors and control for part winding starting, gearmotors and resilient-base integral-horsepower induction motors. General Electric Co.

**342** **Variable Speed Motors**—Sixteen-pp Bulletin 1791, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls; etc. U. S. Electrical Motors, Inc.

**343** **Commutator Slip Ring Maintenance**—This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their corrections; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

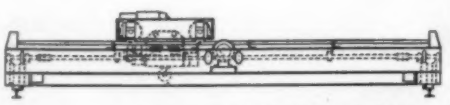
**344** **Electrical Equipment Digest**—Electrical equipment illustrated and described in 138-pp Catalog Digest 139, includes load centers, circuit breakers, low voltage control, fusible service equipment, interchangeable hubs, meter equipment and accessories, meter sockets and troughs, safety switches, panelboards, duct and fittings, starters, magnetic breaks, relays, contractors and many other types of equipment. Complete engineering data given. Square D Co.

**STANDARD HEADROOM**
Provides highest hook height with top-running trolley and foot mounted hoisting unit.



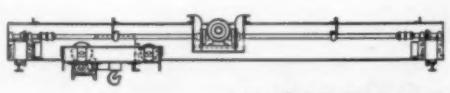
Model DTMD—TT

**MEDIUM HEADROOM**
Here the hoisting unit is rigidly suspended from the top-running trolley to reduce clearance over rail.



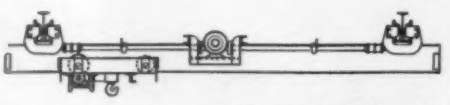
Model DTMD—LT

**LOW HEADROOM**
Under-running trolley permits unusually high hook lift. Use it where clearance under bridge must be maximum.



Model DTMD—UT

**SUSPENDED TRACK**
Operates on lower flange of crane runway suspended from roof guiders or other overhead support. Use also where load transfer is desired.



Model DUMD—UT

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for any building condition

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Describes in detail the many design and operating advantages of CRANEMASTER overhead traveling cranes. Also explains how Abell-Howe provides competent service from original survey to final installation.

ABELL-HOWE COMPANY 7747 Van Buren Street • Forest Park, Illinois

For more facts circle 637 on Reply Card

100,000-gal. Horton Watersphere built for sprinkler service at the Ball Brothers Company plant in Hillsboro, Illinois.

***How the cost of Fire Insurance was reduced at Ball Brothers Company***

# HORTON WATERSPHERE

## reduces fire insurance premiums 90 per cent for Illinois plant

A sprinkler system and a 100,000-gal. Horton Watersphere® are saving Ball Brothers Company 90 per cent of its former fire insurance premiums at their Hillsboro, Illinois, plant. The Watersphere provides a dependable gravity pressure water supply for the plant's sprinkler system. It is estimated that the sprinkler system and the Watersphere will pay for themselves in ten years from insurance savings.

The Watersphere was pickled and painted by the Horton Pickling Process prior to shipment from the Chicago plant.

Horton Waterspheres are built in sizes to 250,000 gallons. Write our nearest office for further information on Waterspheres or other Horton elevated tanks.

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*Plants in* BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

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**Machine-installation cost cut 70%**

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**Plant-layout-change cost cut 90%**

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**Production-labor cost cut 20%**

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**Rejects cut 100%**

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**Tool-change time cut 80%**

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## DATA FILE

(Begins on page 218)

**345** **Motor Controls**—In the 86-pp Controlog are cataloged a variety of motor controls including starters, control centers, contactors, relays, switches, and accessories. Fully illustrated with photos and dimensional drawings, gives applications and descriptive information on each class, and includes prices and ordering data. General engineering data included. The Clark Controller Co.

**346** **What You Should Know About Circuit Breakers**—Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, inrush current effects, tripping and reset time. Heinemann Electric Co.

**347** **Enclosed Switches**—Catalog 83, 28 pp, describes in detail enclosed switches for industrial applications. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches, all of which are available in a variety of actuator designs, contact arrangements and electrical ratings. Photos, dimensional drawings, circuit diagrams, electrical data are included. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

**348** **Low Voltage Switchgear**—Twelve-pp Bulletin 6004B presents low voltage switchgear of the metal-enclosed, drawout type for indoor and outdoor installation using Types K and LG air circuit breakers. Design and construction details are explained and illustrated and emphasis is placed on safety advantages afforded by test position with door closed. General specifications and standard frame arrangements given. I-T-E- Circuit Breaker Co.

**349** **Panel Components**—Bulletin EE-120 is a 54-pp panel builders handbook of electrical components, containing specifications, diagrams, dimensions, photos and price lists of company's motor control. Profusely illustrated with photos, dimensional and wiring diagrams, bulletin covers manual starters, relays and contactors, magnetic starters in non-reversing, reversing, and multi-speed types, and a group of accessories which include thermal overload relays, oil tight pushbutton units, limit switches, timing devices, solenoids, electrical interlocks, and solenoid-operated brakes. Cutler-Hammer, Inc.

On pages 213-214 are two postage-free Reader Service Cards provided for your convenience in ordering these catalogs. You may also use the cards to order any literature mentioned in ads.

**350** **Aluminum Conduit Fittings**—To fulfill the need for electrical equipment made of materials which resist corrosive attack of many chemicals destructive to ferrous or standard aluminum equipment, Bulletin 2681 presents a broad selection of Condulets and related equipment utilizing copper-free aluminum alloy in their construction. It includes Condulets, lighting fixtures, plugs and receptacles and others for both hazardous and non-hazardous locations. Book provides a pictorial-descriptive index plus full catalog listings, prices. Crouse-Hinds Co.

**351** **Electrical Wires, Cable**—Bulletin 1105, Section 1, 16 pp, features a cable selection chart and complete engineering information on company's line of electrical wire and cable. Advantages of the products are detailed, a table of insulations furnished, and design and construction features illustrated. The Okonite Co.

**352** **Wires and Cables**—Interlocked armored cable, supports and fittings designed for low cost, heavy duty industrial, power or control wiring are described in this 24-pp bulletin. Photos and specific descriptions of


RCA SPECIAL RED

# ELECTRON TUBES

**RCA-5690—full-wave vacuum rectifier**
**RCA-5691—high-mu twin triode**
**RCA-5692—medium-mu twin triode**
**RCA-5693—sharp-cutoff pentode**

10,000 hours minimum life*!—one of the many important reasons why RCA "Special Reds" are so often specified. The following features of RCA "Special Reds" add up to *extraordinary reliability*—essential to continuous production where electronic controls are in use:

• Extra-long life • Exceptional stability throughout life • Extreme uniformity of characteristics from tube to tube • High resistance to shock and vibration • Selected high-quality materials and superior workmanship.

RCA "Special Reds" are available through your RCA Industrial Tube Distributor. Contact him today for the booklet "RCA Receiving Tubes for Industry and Communications."

*Or two years service after initial use (whichever occurs first) when used within ratings.

RCA TUBES FOR INDUSTRY
RADIO CORPORATION OF AMERICA
Tube Division Harrison, N. J.

**For more facts circle 640 on Reply Card**

This 'Budgit' Hoist and low-cost 180° swinging jib crane serves a 353 sq. ft. work area. Crane can be assembled in your plant in an hour.

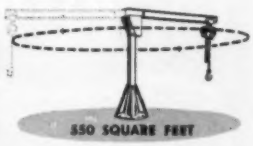
# Here's Hard-to-Beat Load Handling For You!

**IT'S ECONOMICAL.** The 'Budgit' Hoist is the most widely used electric hoist in the world. It's simple, efficient mechanism and powerful motor provide fast lifting action. A ¼-ton load can be raised a foot in less than two seconds. Capacities range from ⅛ to 2 tons. A few cents pays for the electricity to operate any 'Budgit' all day.

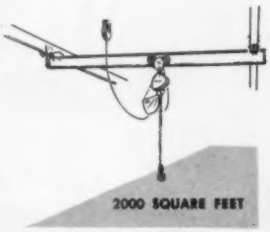
**IT'S ADAPTABLE.** Used alone, the 'Budgit' Hoist can serve a work area of 19½ sq. ft. To multiply the operational range of any 'Budgit' many times, we can supply a variety of low-cost jib and bridge crane assemblies. With any one of them every shop or factory can have efficient, easily-installed crane service that makes a single hoist do the work of several.

**IT'S SAFE.** To protect the operator, the load and the hoist itself, the 'Budgit' has automatic upper and lower safety stops; one hand control; **two** instant-action brakes, each alone powerful enough to hold the load; fracture-proof hooks; enclosed wiring — and many more.

**Your "Shaw-Box" Distributor can give you full details on 'Budgit' Hoists and crane equipment . . . or write us for Bulletin 406.**




A 'Budgit' Hoist on full-revolving, self-supporting 'Load Lifter' Jib Crane can serve a 550 sq. ft. area. Excellent on shipping platforms, at machine tools, in foundry molding bays. Crane bolts to floor; rotates on ball bearings.




Used with a No. 62 'Budgit' Bridge Crane Assembly, a 'Budgit' Hoist can serve a 2,000 sq.ft. area. Crane comes in a "package"—your men can assemble the unit without drilling or machining.

A 'Budgit' Hoist on a 'Budgit' Gantry "A" Frame provides economical mobile service for machine shops, service stations and places where loads must be lifted and moved anywhere in the work area.

57A-10

MAXWELL MANNING M&M & MOORE INC. TRADE MARK

## 'Budgit'® ELECTRIC HOISTS

**MANNING, MAXWELL & MOORE, INC.**

SHAW-BOX CRANE & HOIST DIVISION

362 West Broadway, Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

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Made of strong neoprene coated cotton or nylon fabrics spiral wire reinforced.
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Exceptionally easy to cut, install, connect, reuse, and relocate.
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# DATA FILE

(Begins on page 218)

various types of armored cables available for voltages through 15,000 v, single and multiconductor are included. Arranged in table form are dimensional data, including conductor size, stranding, insulation, sheath and armor thickness, outer diameter and weight. National Electric Products Corp.

**353** **Trolley Busway Systems**—Three bulletins offer real help on electrical installations involving cranes and hoists, assembly and production lines, moving test lines and other moving electrical equipment. Bulletin 35 (28 pp) covers 225-500 amp systems; Bulletin 50 (44 pp) 100 amp systems; Bulletin 45 (40 pp) 60 amp systems. Each includes special sections on installation planning and procedure, methods of mounting and descriptions and illustrations of equipment. Feedrail Corp.

**354** **Asbestos Insulation**—"Specifications for Asbestos Varnished Cambric N.E.C. Type AVA Lighting Wire and Power Cables," 8 pp, establishes performance tests for asbestos insulation applied as a felted wall in combination with varnished cambric tapes for wires and cables with 600 and 1000 v ratings. Also measures plus values of the construction over and above industry standards. Standards for test characteristics, such as minimum permissible breakdown after initial dielectric test are covered. Rockbestos Products Corp.

**355** **Switch Wiring Diagrams**—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporate more than one useful feature. Includes key to electrical symbols used. Allen-Bradley Co.

**356** **Electrical Connectors**—Eight-pp Bulletin 637 introduces the Pyle-Star line of compact, lightweight and environmental-resistant electrical connectors for industrial and other applications. Electrical capacities and other data are given for the new plugs and receptacles, claimed impervious to water, moisture, oil, gas, dust, pressure, and shock. The Pyle-National Co.

**357** **Battery Manual**—Battery selection techniques are emphasized in 20-pp Bulletin 210, a revised edition of this manufacturer's manual on storage batteries for stand-by power, emergency lighting and switchgear applications. A discussion of charging equipment and simplified battery maintenance procedures is included. Storage battery installation proceedures are described and illustrated by photos. Exide Industrial Div., The Electric Storage Battery Co.

**358** **Handbook on Storage Batteries**—This 64-pp booklet on instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

**359** **Motive Power Batteries**—This 48-pp general service manual on lead-acid batteries for all types of motive power application is a practical guide to industrial cycle service, including industrial truck, air conditioning, and others. Includes photos, charts, tables, methods of repair, maintenance and theory of operation, instructions covering repairs with regular or special tools, simplified testing methods, including safety practices, acid handling precautions, and charging methods. C & D Batteries, Inc.

**360** **High-Capacity Fuses**—Form HCS, 6 pp, describes fuses of unlimited interrupting capacity on voltages to 600, designed to afford protection for loads of 600 to 5000 amp. Includes test data, charts on opening time, current limiting effect. Bussman Mfg. Co.

**361** **Testing Instruments**—Bulletin 19-56, 16-pp, features company's electrical testing instruments, including ohmmeters, ground testers, dielectric test sets, motor rotation tester, cable fault locating equipment, transformer turn ratio

KORFUND
MACHINERY MOUNTS

Speed Machinery Installation

- Eliminate Foundations
- Eliminate Bolting
- Provide Mobility

Increase Production

- Improve Equipment Layout
- Increase Speeds
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All these advantages are yours, and vibration and noise control, too, with Korfund machinery mounts. We'd like to send you case histories, guide bulletins—a veritable library of machinery mounting information. Write today, mentioning Bulletin 47.

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# LURIA MEANS FULL RESPONSIBILITY

The new windowless addition of 94,000 sq. ft. constructed by Luria is shown by dotted outline. Special studies by Luria solved problems of erection on partially filled land. Unique floor specifications required similar close attention by Luria.
LURIA SAVED
6 VITAL MONTHS
in Whitin Machine Works
expansion program

*"Luria dove-tailed construction to our requirements—enabled us to take over our new facilities and re-arrange our production flow with minimum delays."*
*P. B. Walker, Maintenance Engineer*

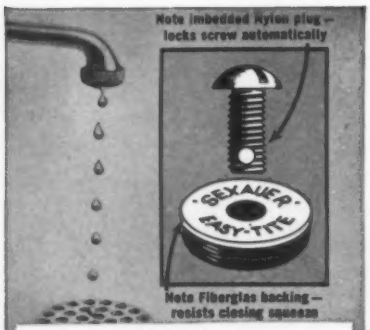
*"Fast construction by Luria helped our diversification program. We appreciated Luria's cooperation in maintaining agreed-upon specifications and in staying within their cost estimates."*
*E. O. Pierson, Vice President*

Six months' saving of time in launching an ambitious diversification program meant a lot to the Whitin Machine Works, old-established manufacturers of textile preparatory machinery. That's why they are so pleased with the factory addition shown above, recently built at their Main Plant in Whitinsville, Mass. It was constructed by the Luria Engineering Company in record time.

The Luria way makes possible quick construction of any warehouse or factory building, at a competitive price. Luria plans, designs, fabricates and constructs, with all responsibility centered in one competent organization. There are no delays because Luria maintains its own stocks of steel and complete fabricating facilities ready to meet any need. What is more, Luria methods make possible short cuts that save time and money.

You will find it pays to investigate the Luria way. Luria representatives in the cities listed below will give you complete information. Or call LURIA ENGINEERING COMPANY, 511 Fifth Avenue, New York 17, New York.

DISTRICT OFFICES: ATLANTA, PHILADELPHIA, BOSTON, CHICAGO, NEW YORK, WASHINGTON, PITTSBURGH, RICHMOND, DAYTON
PLANTS: BETHLEHEM, PA. • CHICAGO HEIGHTS, ILL.




# Why Faucets Leak

**—9 out of 10 washers are fastened with —TOO LONG or SHORT screws. The screws —QUICKLY LOOSEN, thus loose washers —are destroyed thru grind and squeeze —of opening and closing faucets.**

**34 years of research uncovers new solution**

**—Now, NEW (Patented) 'Sexauer' SELF- —LOCK Monel screws, with an imbedded —expanding NYLON PLUG, lock at the re- —quired depth AUTOMATICALLY—hold —washers FIRMLY!**

**—Made of rustproof, non-corroding —MONEL, heads don't twist off or screw —slots distort. They are easy to remove —when necessary, can be used over and —over.**

**—Used with NEW 'Sexauer' EASY-TITE —faucet washers, this combination out- —lasts past faucet repairs "6 to 1"! —EASY-TITES are made of super-tough, —pliable du Pont compound (neither rub- —ber nor fiber) and reinforced, like a —tire, with a vulcanized layer of Fiber- —glas, they resist distortion and splitting —from shut-off grind and squeeze.**

**The hidden costs of faucet leaks!**

Faucet leaks are costly! As authenticated by Hackensack, N. J. Water Co. and American Gas Association, STOPPING just ONE PIN-HOLE SIZE (1/32") LEAK can reduce water waste 8,000 gal. quarterly. If a HOT WATER FAUCET LEAK, water and fuel savings JUMP to over $7.58 QUARTERLY—plus additional savings on MATERIALS—LABOR—and *costly* FIXTURE REPLACEMENTS!

NEW SELF-LOCK screws and EASY-TITE faucet washers are just TWO of the "SEXAUER" line of over 3000 TRIPLE-WEAR plumbing repair parts and Pat'd. precision tools.

A "SEXAUER" Technician in your vicinity will make our NEW 126 page Catalog "H" available. He will gladly consult with you regarding a SURVEY of your plumbing fixtures to determine correct repair parts required and establish reasonable stock levels that avoid both overstocking and shortages—thus providing for efficient stock arrangement and control—all without obligation. WRITE TODAY.

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Gentlemen: *Please send me a copy of your NEW, 126 page Catalog "H."*

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SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

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# DATA FILE

(Begins on page 218)

test sets, corona test equipment, frequency meters, tachometers, others. Includes photos and descriptions of each type, including chief features, operating ranges, and suggested applications for them. James G. Biddle Co.

**362** **Flexible Cords** — This well-illustrated 24-pp booklet includes all new Underwriters classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on how to select proper cord. Whitney Blake Co.

**363** **Cable Troughs**—This 12-pp catalog offers a simple solution to any design problem of change of direction or elevation with a complete set of standard fittings, horizontal elbows, inside and outside vertical elbows, ties, crosses, covers and many special fastening devices to save time and labor. Contains full instructions for installations, load charts, accessory items, some typical installations and full list of distributors. The Globe Co.

## LIGHTING

**364** **Architectural Floodlighting** — Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. Also contains tips on floodlighting of vertical surfaces and discusses four "musts" of an efficient economical floodlighting installation. A table of recommended foot-candle levels for exteriors provided. General Electric Co.

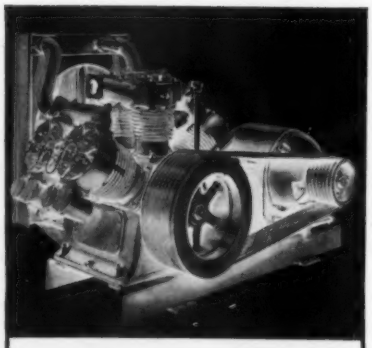
**365** **Recessed Lighting**—Divided into sections to aid in selection of lighting units, this 36-pp catalog gives complete illustrations and detailed dimensional data for one- and two-foot architectural troffers in all types of ceiling construction. Includes information on various ceiling lighting patterns, plus selection of shielding designs in plastic, glass, lens (flat and dished), plastic louvers. Also gives photometric tables. Smithcraft Lighting Div.

**366** **Outdoor Mercury Lighting**—"How Mercury Vapor Outdoor Lighting Brings More Night Action," 8 pp, stresses low cost and versatility of mercury vapor lamps. Shows their use in such locations as industrial areas, parking lots. Includes data on company's new Silver White lamp, which offers an increase in efficiency over clear lamps. Also features Golden Mercury Vapor lamp, which provides a "warmer" light and is a natural caution light. Sylvania Electric Products Inc.

**367** **Plant Lighting Planning Guide**—This 32-pp handbook of industrial lighting presents economics of plant lighting program in terms of lower production costs, reduced working time, less fatigue and eyestrain, less spoilage, fewer accidents, better morale. Explains six major steps in initiating, developing and carrying out a lighting program; tells how to select equipment and stresses importance of maintenance. Includes table of recommended levels of illumination for industrial interiors. Benjamin Electric Mfg. Co.

**368** **Lighting Unit Specifications**—The new 1957 edition of the "RLM Standard Specifications for Industrial Lighting Units" contains important revisions in specifications on both incandescent and fluorescent units, as well as new lighting data. Of special importance are new coefficient of utilization tables for eight units. Calculations are based on latest zonal method of computing coefficients of utilization and illumination on room surfaces. Also included are revised light distribution curves on RLM direct and semi-direct fluorescent units, popularly called "upward light." Candlepower distribution curves are plotted at normal, parallel and 45 deg. RLM Standards Institute.

**369** **Illumination Design Data**—Basic reference data on interior lighting installations is contained in 48-pp Manual A-4854, which features a section describing footcandle levels required for each group of seeing tasks. These footcandle levels are then related to many kinds of rooms and areas. A chapter on interior lighting design describes ways of calculating quantity of light for an area and covers such subjects as selection of lighting systems, maintenance factors, and location of luminaires. A series of tables minimize mathematical calculations necessary. Westinghouse Electric Corp.

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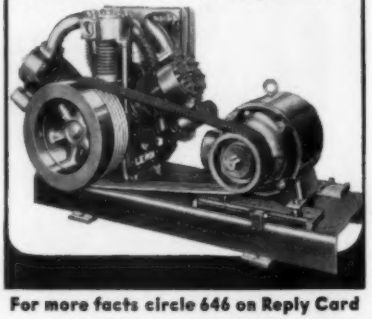

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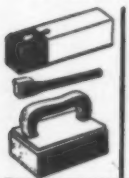

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# DATA FILE

(Begins on page 218)

## MECHANICAL POWER TRANSMISSION

**370** Roller Chains, Sprockets—Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum bore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

**371** Sprockets and Chain — Bulletin A-624 24 pp, is compiled to provide plant engineers with all data required for selecting and ordering roller chain and sprockets. Devotes a page to Taper-Lock sprockets for each size of chain from 40 to 100, giving sectional drawing, dimensions, number of teeth, maximum stock bore available, weights, prices and other data. Another page covers Taper-Lock bushings; and full information is given on riveted and cotter-type roller chains. Dodge Mfg. Corp.

**372** Helical Gear Drives—A new line of in-line helical gear drives is described in 16-pp Book 2651. Load classes for over 250 applications, overhung load ratings and dimension tables, instructions for proper selection and cut-away views of both double and triple reduction drives are given. Link-Belt Co.

**373** Fluid Drive — Eight-pp Bulletin 9819 describes and illustrates adjustable speed Gyrol fluid drives, 1- through 25-hp, giving advantages and applications. Components and operation are covered in detail and selection tables are provided for direct connected and V-belt types. American Blower Corp.

**374** Adjustable Speed Drives—Bulletin P B-4700-1 describes company's packaged adjustable speed drives—covering latest developments in design and construction. Tells how these packaged, pre-wired, pre-assembled units provide flexibility of d-c motor performance from an a-c power supply, and offer simple, convenient speed adjustment without intermediate speed changing equipment or line shafting. Crocker-Wheeler Div., Elliott Co.

**375** Cylindrical Roller Bearings—Multi-Row cylindrical roll neck bearings are described in 24-pp Form 436. Contains complete engineering and technical data on cylindrical roller bearings designed for heavy-duty service in roll neck mountings on hot and cold rolling mills. Typical installations are illustrated, and mounting and dismounting, assembly, capacities, lubrication, inspection, sizes and dimensions, and engineering data covered. SKF Industries, Inc.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 213 and 214.

**376** Power Transmission Equipment—Form 1200, 12 pp, describes a full line of conservatively rated equipment for various power transmission requirements, including flexible couplings, variable speed pulleys, variable speed belts and sheaves, variable speed transmissions, motor bases, and universal joints. Dimensional and capacity data are tabulated. Lovejoy Flexible Coupling Co.

**377** Flexible Couplings—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

**378** Fluid Couplings—Bulletin 144-D, 14 pp, presents complete installation and performance data on fluid couplings. Illustrated with dia-


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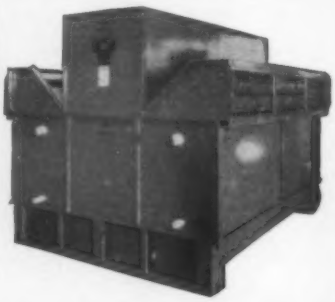

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# DATA FILE

(Begins on page 218)

grams and drawings, bulletin shows ease of applying company's fluid couplings on any type industrial equipment, powered by any type electric motor or internal combustion engine from 3/4 to 850 hp. Describes standard models providing standard input, output combinations, and standard models in packaged units. Installation hook-ups are given, along with typical applications. Twin Disc Clutch Co.

## LUBRICATION

**379** **For Better Lubrication**—Advantages of company's lubricants which are specially compounded for lubrication of reduction gear drives are outlined in pocket-sized folder. Features which assure smooth, trouble-free gear drive performance and lower maintenance costs are listed. Gulf Oil Corp.

**380** **Lubricant Data Book**—The 16-pp current edition of this company's popular Lubriplate Data Book offers practical information on lubrication of machinery. Gives product data on grease type and fluid products, hydraulic oil, compressor oil, motor oil. Suggestions on applying lubricants under normal and special conditions are provided. Several pages are devoted to lubricant recommendations for equipment used in a variety of industries. Lubriplate Div., Fiske Bros. Refining Co.

**381** **Multi-Purpose Grease**—This bulletin describes Gargoyle Grease BRB No. 1, intended to provide correct lubrication for practically all normally loaded anti-friction and plain bearings. Tells how it resists leakage, affords protection. Socony Mobil Oil Co., Inc.

**382** **Lubricating Air Conditioning Machinery**—The problems of lubrication of air conditioning machinery are discussed in V-41 No. 7 of "Lubrication," a company magazine. Describes various components of refrigerating system and discusses lubrication practice, effects of refrigerants on lubricating oil, oil carryover, and lubricating oil requirements. The Texas Co.

**383** **Lubricating Greases**—Bulletin 49 features two grades of greases developed for maximum lubrication under special bearing conditions—heavy loads, shock loads, and overloads. Uses, application methods, physical properties and benefits are detailed, and specifications are included. Sun Oil Co.

## BOILERS, AUXILIARIES

**384** **Preheating Combustion Air**—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels. Air Preheater Corp.

**385** **Hot Water Boilers**—Catalog HCC-2, 20 pp, describes and illustrates design, construction, advantages and economies of company's controlled circulation hot water boiler for supplying high pressure, high temperature water for heating systems and process applications. Comparison of heat content—water vs steam—is indicated on table, and schematic layouts are included. Photos of typical installations are also featured. Combustion Engineering, Inc.

**386** **Shop Assembled Boiler**—Sixteen-pp Bulletin G-76 completely describes and illustrates company's Type FM water-tube integral-furnace boiler, made in standard sizes from 2900 to 28,000 lb of steam per hr, pressure to 250 psi. The Babcock & Wilcox Co.

**387** **Package Boilers**—This 12-pp booklet on package steam generators describes the formulas behind all package steam generators, and illustrates how installation of a package steam generator can raise steam capacity in an existing boiler room without extensive structural changes. Shows plant operators how to make survey of their own steam requirements. Cyclotherm Div., National-U. S. Radiator Corp.

**388** **Standard Generators**—Bulletin B-55-4 describes company's SC economy series of standard steam generators designed to reduce steam costs for industrial plants. Pre-engineered,

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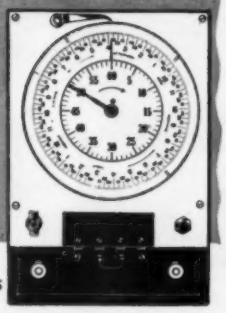
you can get it to the second with . . .



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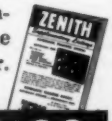


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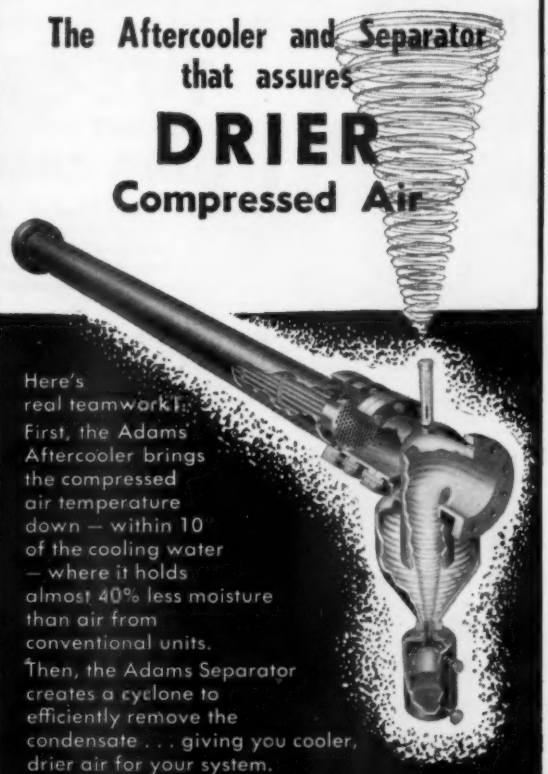

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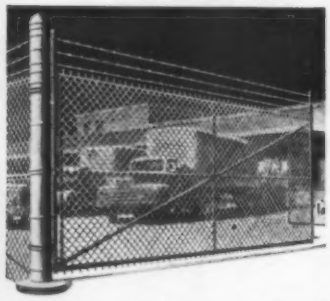

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# DATA FILE

(Begins on page 218)

standardized steam generators offered in nine sizes with capacities of from 50,000 to 150,000 lb per hour are described, and schematic and cutaway drawings of the units and design features are included. Foster-Wheeler Corp.

## SPACE, PROCESS HEATING

**389** Plumbing, Heating Supplies—Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended J. A. Sexauer Mfg. Co., Inc.

**390** On Unit Heaters—Latest improvements, specifications and performance data for Herman Nelson horizontal and vertical unit heaters are covered in 36-pp Bulletin 700A. Includes complete hot water and steam performance tables, dimensions, selections, applications, descriptions of cabinets, elements, motor mountings, fans and accessories, controls. Also provided are suggested layouts, piping diagrams. American Air Filter Co., Inc.

**391** Revolving Unit Heaters—Bulletin HR-6A, 16 pp, features revolving unit heaters for industrial plant heating, presenting design and construction details and showing typical installations. Engineering data, mounting heights and coverage, and dimensions are tabulated, and dimension drawings are included, along with installation tips. L. J. Wing Mfg. Co.

**392** Unit Heaters—Catalog 157, 32 pp, contains performance and application data on company's line of unit heaters, including design and construction details, dimension diagrams, and tabulated information on steam capacities, conversion factors, hot water capacities, performance factors, and heat transfer coefficients. Piping and installation are illustrated and described, and typical specifications detailed. Modine Mfg. Co.

## PUMPS, COMPRESSORS

**393** General Purpose Pumps—Section B, 36 pp, describes rotary pumps for general purpose use. Explains positive displacement principle incorporated, gives suggestions for selecting proper materials of construction. Application and ordering information is provided on mounted and unmounted small pumps, large mounted pumps, pumps for operations requiring greater sealing, and large, totally enclosed models. An engineering section covers recommended speeds and capacities. Viking Pump Co.

**394** For Abusive Pumping Jobs — Catalog 4906, 36 pp, covers centrifugal pumps for wide industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pump; a horizontal shaft, single-stage, rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit applications. Nagle Pumps.

**395** Condensation Pumps—Eight-pp Bulletin 1403 describes company's line of condensation pumps for use in low and medium pressure-heating systems and steam-process equipment. Photos, drawings and other technical data on capacities and dimensions pertaining to construction, application and installation are included. Dunham-Bush, Inc.

**396** Pump Data—Application and capacity data on company's line of pumps, including centrifugal pumps, screw pumps, reciprocating pumps, and rotex pumps, are presented in this product bulletin. Photos of each of the models, along with descriptive detail, are included. Warren Pumps, Inc.

**397** Air Cooled Compressors—Bulletin AC-15, 16 pp, shows a complete line of small, air-cooled compressors for industrial, and other use. Both one- and two-stage compressors are covered, with working pressures ranging from 85 to 175 psi. Complete specifications for each model are given and two charts—one for figuring compressor needs and another showing estimated air consumption for 30 common shop jobs—are printed. Gardner-Denver Co.

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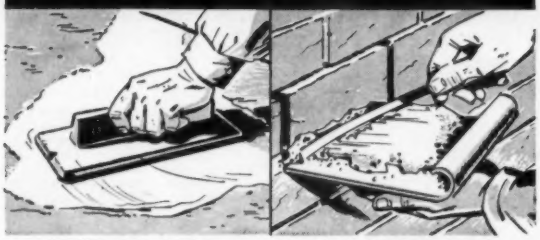

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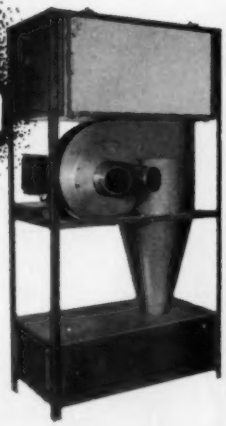

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*...whisper-quiet performance*

Where noise adds to costly confusion you are wise to install whisper-quiet Propellair Type "QD" fans. The efficient air foil design of the rigid, precision balanced, cast aluminum propeller eliminates vibration noise and the sounding board effect of ordinary thin sheet metal blades. The special blade pitch delivers high volumes of air at quieter, lower speeds. Noise is further reduced by Propellair's steel venturi entrance ring. Powered by dependable, totally-enclosed Robbins & Myers motors, they are available in sizes from 12" to 36". Air delivery capacities from 1235 to 12000 CFM.

WRITE FOR BULLETIN NO. 695-PE

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DIV. OF ROBBINS AND MYERS, INC.
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MAN COOLER SKY-BLAST VANEAXIAL TUBEAXIAL EXTENDED SHAFT

MOVING AIR IS OUR BUSINESS

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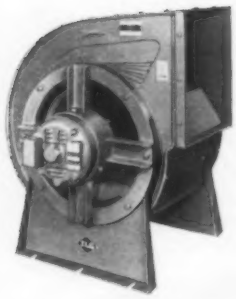

DELIVER MORE AIR AT SAME SOUND LEVEL WITH

**ILG AIRFOIL FANS**

Ilg Type BC Centrifugal Fans have airfoil blade design that reduces shock loss, increases efficiency. Heavy duty, suitable for NAFM Class I, II and III operations without price penalty.

**They provide long life with trouble-free operation.** Motor is direct-connected and designed exclusively for fan use. Belted models also available.

**Installation is easy, requires less space**—no separate motor pedestal required. Suitable for floor, wall or ceiling installation.

**NAFM label** certifies all ratings. Write today for more information on Ilg Type BC Airfoil Centrifugal Fans. Request Bulletin S-316.

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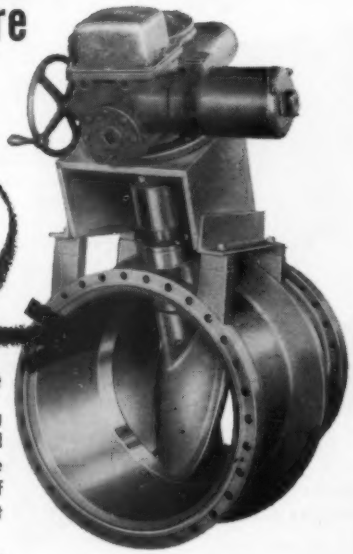
**at HIGH Temperature and HIGH Pressure**

*Stress Sealed Butterfly Valve*



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Unique W. S. Rockwell pressure sealing arrangement enables disc to seat full 360° against inflated alloy band in valve body, practically eliminating leakage of gases even at 800°F. or higher and at pressure to 250 psi.

Illustrated is a 30" valve with motor operator; other sizes to 132".

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# DATE FILE

(Begins on page 218)

**398** Air Compressors—Bulletin A-62, 20 pp, covers construction, operation information on company's class WN-112 heavy-duty air compressors. Illustrates five models of compressor, for displacement capacities from 368 to 974 cfm at sea level, and four high altitude models for 532 to 1100 cfm. Joy Mfg. Co.

**399** Portable Compressors—Twelve-pp Catalog GG-9A pictures 40 models of company's portable type compressors. A quick reference chart shows capacities, engine types, and mountings available. Illustrates such features as: replaceable cylinder sleeves, interchangeable valve parts, aircraft type compressor cylinders, heavy duty industrial type engines. Le Roi Div., Westinghouse Air Brake Co.

**400** Industrial Compressors—Bulletin SSB-56 covers company's complete line of industrial air compressors from the 1/2 hp to 150 hp, including the accessories that go to make a complete installation. Photos of the various models are included, as well as specifications and dimensions. Schramm, Inc.

**401** For On-the-Spot Air — Eight-pp Form 2302 features company's self-contained Spot-Air portable compressor. Deals with the many tools it will operate, with actual on-the-job illustrations pointing out added advantages of this light-weight compressor on jobs where bigger compressors are not needed. Ingersoll-Rand Co.

**402** Air Compressors—Catalog C-100, 30 pp, features comprehensive descriptive and engineering detail on company's line of air compressors, including electrical specification codes and instructions for ordering. Large cutaway view illustrates component features and tables list complete specification data. Distinctive design features are illustrated with cutaway photos and diagrams, and selection data is included. Curtis Pneumatic Machinery Div., Curtis Mfg. Co.

**403** Compressor Data—Feather valve compressors from 75 to 350 hp are described in 32-pp Bulletin L-676-B1A. Advantages on installation, operation and maintenance costs are outlined for types YC and DYC compressors. Information and illustrations are offered on component parts, including frame, running gear parts, intercooler, crosshead, motor and main bearings and various cut-away views are included. Variable capacity control information is listed along with data on governors. Diagram illustrates correct selection and coordination of auxiliary equipment. Worthington Corp.

## TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

**404** Data for the Shop—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Standard Oil Co. (Ind.)

**405** Portable Electric Tools—This standard catalog, Form 10, 24 pp, features portable electric tools, including electric drills, bench-drill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners and others. Photos included. The Black & Decker Mfg. Co.

**406** Pipe Tool Ordering Guide—Catalog 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

**407** Pipe Tools—Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596R-5. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives, pipe and bolt threading machines, oilers. Capacity, price data included. The Ridge Tool Co.

**408** Where to Use Your Stud Driver—Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers

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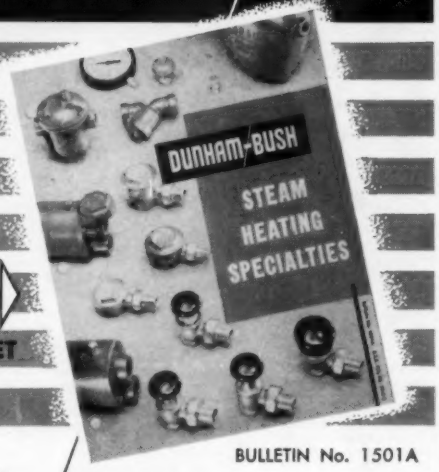


BULLETIN No. 1501A

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*UNIT HEATERS • SPECIALTIES*

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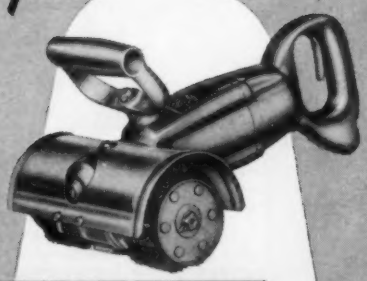
RUST
PAINT



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**CLEANING TOOLS**
**ELECTRIC OR PNEUMATIC MODELS**

Surfaces are cleaned quickly with AURAND on the job. Hardened steel cutters zip away stubborn accumulations from iron, steel, brick, concrete. Adjustable depth shoe protects surface . . . assures uniform cleaning. No special skill required. Renewable cutter heads. Two sizes in both electric and pneumatic models. Lightweight.

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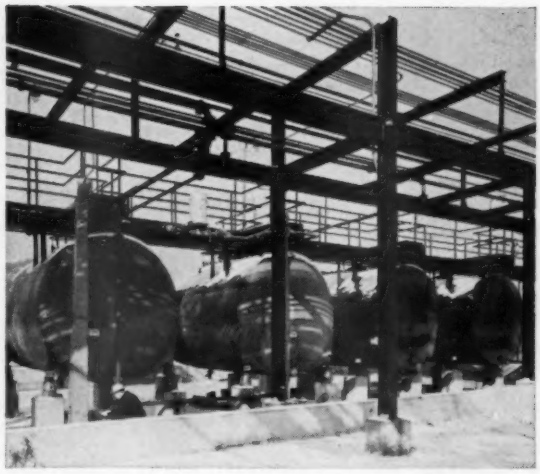

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You get maximum protection against corrosion at the lowest cost when you install Chemstor glassed-steel tanks.

**Chemstor is inexpensive**—Costs less than a dollar a gallon in all but the smallest sizes and as little as 25¢ a gallon in the larger sizes. Sizes range from 750 to 35,000 gallons.

**Chemstor protects product**—The glass lining in a Pfaudler Chemstor tank cannot contaminate or discolor your product. This hard, smooth glass also lends itself to quick and thorough cleaning and sterilization. Even sticky products do not generally adhere.

**Vertical and horizontal types**—Both vertical or horizontal tanks are furnished with flanged nozzles 3″ I.D. and up, as required; also standard 12″ x 16″ manholes, glassed on inside.

For complete information on construction, sizes, and accessories, send the coupon for bulletin.

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Please send me:

☐ Bulletin 918, Pfaudler Chemstor Tanks

☐ Bulletin 947, Buyer's Guide to Pfaudler Corrosion-resistant Process Equipment

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# DATA FILE

(Begins on page 218)

use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use for attachment of pre-drilled fixtures. Remington Arms Co., Inc.

**409** **Industrial Tools**—Hand tools and shop tools for production lines, maintenance work and service departments are featured in 108-pp Industrial Catalog 54-1. Loaded with pictures and tool facts, the book describes in detail the complete line of over 4,000 tools—including chests and cabs, wrenches and sockets, screwdrivers, pliers, pulling equipment, tool assortments and many others. Snap-On Tools Corp.

**410** **Portable Tools**—Industrial construction and other portable power tools for the manufacturing, construction, woodworking and metalworking industries are described in this 50-pp catalog. Tools appear in logical sequence of size and duty rating. Specification tables at bottom of each page permit easy selection of tools. Accessories for all tools are also cataloged. Skil Corp.

**411** **Electrode Guide**—Catalog 1318 is a 58-pp pocket guide to electrode selection. Mechanical properties and testing of electrodes, specifications, classification and properties of electrodes, are among the data featured, and different types of electrodes for a variety of applications are described. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

## VALVES, TRAPS, PIPING AND ACCESSORIES

**412** **Diaphragm Valves**—Catalog V-55, 34 pp, covers operation, installation and selection of diaphragm valves for handling of acids, alkalis, gases, volatile and viscous substances, water and other fluids, compressed air vacuum, slurries, semi-solids, beverages and food products. Diaphragm materials are described, selection tables included. Hills-McCanna Co.

**413** **Lubricated Plug Valves**—Catalog PV-4, 36 pp, shows in detail a line of iron and steel lubricated plug valves. Many illustrations of single, screwed and bolted gland type valves are shown, including photos, sectional and detailed drawings. Also included is physical data on dimensions, ratings. The Wm. Powell Co.

**414** **High Pressure Valves**—Bulletin B-451, 12 pp, contains complete engineering data on company's valves for high pressure and high temperatures. Typical installations are pictured, dimensions and weights are tabulated, and temperature-pressure ratings are shown. A selection table is included, as well as information on materials, design. Yarnall-Waring Co.

**415** **Industrial Valves**—Bulletin 507V illustrates and describes company's line of industrial valves for control of air, gas, liquids and solids. Features photos and descriptive detail on a variety of valves, including butterfly valves, wafer butterfly valves, slide valves, check valves, proportioning valves. W. S. Rockwell Co.

**416** **For Valve Selection**—Circular 555, 24 pp, is designed as a guide for selecting valves, boiler mountings, and lubricating devices, including the LQ600 bronze globe valves, Luncor PVC all-molded valves, and solder end valves. Tables, technical data and information on the selection of valves, boiler mountings, and lubricating devices are completely indexed for easy reference. The Lunkenheimer Co.

**417** **Valve Performance Facts**—Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Industries include paper mills, refineries, central stations, other plants. Crane Co.

**418** **Valve Comparison Chart**—Form 194R, 22 pp, is a valve comparison chart, listing valve figure numbers of 15 major manufacturers and the OIC equivalent valve figure numbers. Compares variety of valves in ferrous and nonferrous materials, describes different valve lines. The Ohio Injector Co.

**419** **PVC Valves, Fittings** — This 16-pp bulletin describes polyvinyl chloride valves and fittings offering resistance to most salts, alkalis and acids. Bulletin provides application tables on performance of normal impact PVC valves and fittings for handling 315 fluids. Cutaway drawing and text detail design features for long-time control of corrosives. Tables show physical properties, recommended working pressures and effect of temperature on working pressure. Walworth Co.

**420** **Steam Trap Book**—Catalog J is a 44-pp manual and ordering guide in which 17 pp are devoted to data on fundamentals of good trapping and trap selection. Installation and maintenance instructions are also provided. Book lists steam traps for maximum pressures of 250, 600, 900, 1500 and 2500 psig. Included, also, is a section on trouble shooting. Armstrong Machine Works.

**421** **Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for pressure up to 1500 lb. W. H. Nicholson & Co.

**422** **Pipe for Modern Buildings**—This 16-pp booklet discusses wrought iron pipe for modern buildings. Identifies wrought iron pipe and describes composition and advantages. Included are sections on wrought iron's resistance to corrosion and fatigue stresses, weldability, forming and threading, as well as the application of protective coatings. A. M. Byers Co.

**423** **Improved Hose Coupling**—A quick connect-disconnect hose coupling for water, oil, steam, gas and chemical lines is described in this 16-pp bulletin. Describes the coupling's construction and explains how it provides a sealing action which makes the coupling tighter as internal pressure increases, and a full swiveling action. Titeflex, Inc.

**424** **PVC Pipe Fittings, Flanges**—This is a comprehensive 12-pp catalog on corrosion resistant pipe fittings and flanges in normal- and high-impact grades, rigid, unplasticized polyvinyl chloride. Shows characteristics, advantages and limitations. Lists operating pres-


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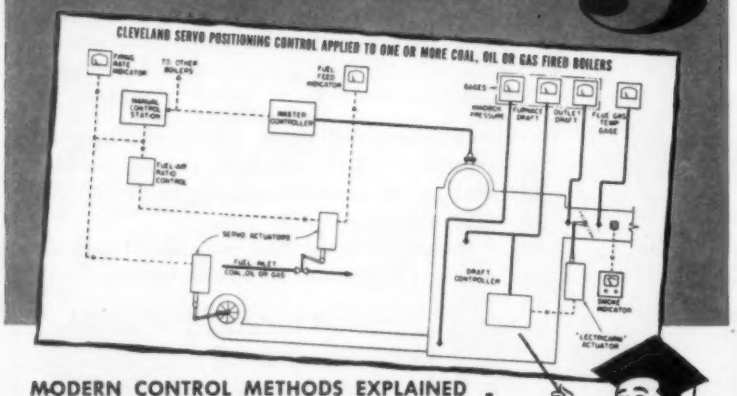


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Number 3 of a series of guides to "Automation in Combustion", this FREE Manual contains engineering data for solving combustion problems. Tells how fuel and labor savings, smoke control, added refractory and boiler life, protection against fumes and explosions are designed into Modern Combustion Control Systems.

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Plant located in semi-rural community of central New York State.

Please forward resumes of experience stating salary desired to personnel director the Norwich Pharmacal Company, Norwich, N. Y.


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■ To improve service and reduce handling costs, F. W. Woolworth uses 12 fully-adjustable ROWE hydraulic docks. Raised or lowered to the level of the truck bed, the Adjust-A-Dock cuts costs by speeding the handling of 100 truck loads of merchandise in an eight-hour shift.

The Rowe Adjust-A-Dock is a rugged, self-contained unit built for long trouble-free service and minimum maintenance.

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## DARNELL
CASTERS AND WHEELS

**RUBBER TREADS** . . . a wide choice of treads suited to all types of floors, including Darnelloprene oil, water and chemical-resistant treads, make Darnell Casters and Wheels highly adapted to rough usage.

**LUBRICATION** . . . all swivel and wheel bearings are factory packed with a high quality grease that "stands up" under attack by heat and water. Zerk fittings are provided for quick grease-gun lubrication.

**RUST-PROOFED** . . . by zinc plating, Darnell Casters give longer, care-free life wherever water, steam and corroding chemicals are freely used.

**STRING GUARDS** . . . Even though strings and ravelings may wind around the hub, these string guards insure easy rolling at all times.

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## Blow away . . . HEAT FATIGUE

**with** *Aerovent* **MANCOOLERS**

model "56"

model "8"

model "39"

"Steeler"

According to medical authorities, workers in hot, oppressive plant areas are subject to "heat fatigue," which causes involuntary work slow-downs, mental depression, and, in some cases, actual illness. This means lowered production, loss of workdays, and costly employe "turnover."

Aerovent "Mancooler" Fans in strategic locations increase worker efficiency and comfort. This obviously results in greater production . . . a very profitable return from a reasonable investment!

Available with 2, 4 or 6 blades, in diameters from 24" to 48", and capacities to 40,000 CFM, there's an Aerovent "Mancooler" for every industrial application: cooling, ventilating, product drying and processing, or exhausting of heat or fumes.

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**Heavy-gauge welded steel construction, with steel front and rear guards for maximum safety. (Rubber-tired wheels for Model 39 at slight extra cost.)**

Rated in accordance with Standard Test Code and U.S.D.C. Comm. Std. CS178-51.

*Aerovent* FAN CO. INC.

Ash and Bond Sts. Piqua, Ohio

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# DATE FILE

(Begins on page 218)

sures, temperatures, applications, price comparisons, fabrication advice, installation and supporting recommendations, dimensions and weights. Grinnell Co., Inc.

**425** **Bellows Design Guide**—Twenty-pp Catalog 155 contains helpful information on applications, design considerations, and standards for metallic bellows. Details on using bellows manufactured from various metals are included. Tables supplement text. Flexonics Corp.

**426** **Jointed Clay Pipe**—Advantages of jointed vitrified clay pipe designed to limit and control leakage of ground water in sanitary systems are described in this illustrated bulletin. Performance characteristics are discussed and typical installations are pictured. American Vitrified Products Co.

**427** **Coupling Data**—Bulletin 240 describes a quick-connect, quick-disconnect H coupling, its uses and construction, with particular reference to U-packer which gives positive seal without compression set because of rubber distortion. A fully detailed cutaway of coupling is included and dimensions and ordering information given. Snap-Tite, Inc.

**428** **Swivel Joints**—Catalog G-4, 32 pp, covers this manufacturer's line of ball-bearing swivel joints as well as other products, including loading racks, manifolding lines, all-metal hose. In addition to providing dimensional and operating data on these products, this booklet is generously illustrated. Chiksan Co.

## FANS, VENTILATING

**429** **Standard Duty Fans**—Designs and construction details of company's line of standard duty fans are covered in 28-pp Bulletin 543. Points out advantages, shows arrangement and application, describes accessories. Tables list specifications. The New York Blower Co.

**430** **Industrial Fans**—Propellair Bulletin 650, 12 pp, contains dimensions, application, and performance data on Tubeaxial and Stackbooster fans. Gives information on cooling and drying problems, system and open surface tank ventilation. Robbins & Myers, Inc.

**431** **Propeller Fans**—Pictorial Bulletin FM-2345, 24 pp, describes design and fabrication of heavy-duty propeller fans and related package units. Covers various types of power roof ventilators, water coolers, heat pump installations, dual service condenser, and evaporator packages, fan assemblies for dry coil condensers, air washer and scrubber installations, stainless steel equipment for corrosive conditions, and others. Sizes, capacities and construction data included. Buffalo Forge Co.

**432** **Ventilating Equipment**—A 36-pp guide to selection of propeller fan type ventilating equipment, Catalog 152 includes specifications and installation data on company's propeller fans in portable, tubeaxial, centrifugal, roof ventilator and other types. Detailed illustrations of contruction features accent design and performance factors. Case study photos show installations. Ilg Electric Ventilating Co.

**433** **Induced Draft Fan Data**—In addition to providing an illustrated discussion of design advantages of company's induced draft Bifucator, 20-pp Bulletin DB-44-56 is an excellent working tool on fan selection. Two methods are presented, along with detailed examples of each. Also included are boiler code ratings of various organizations expressed in Btu/hr, and charts on draft losses. Dimensional diagrams are provided, as well. Typical installations are pictured. DeBothezat Fans Div., American Machine and Metals, Inc.

**434** **Industrial Fans**—Bulletin 702A features company's line of fan equipment for industrial air and material handling applications. Photos illustrate various types available, and complete descriptive detail and a table of general data are included. Clarage Fan Co.

**435** **Roof Ventilators**—Sixteen-pp, Bulletin A-112, revised, covers manufacturer's line of reversible roof ventilators, also penthouse Vertijet, rotary and other models. Sizes, specifications, performance data and dimensional drawings are included. Hartzell Propeller Fan Co.

## VIBRATION CONTROL

**436** **Improved Machine Mounts**—This brochure describes advantages of company's leveling machine mounts. Tells how they enable installation and leveling of heavy machines without bolting or shims, afford increased machine mobility, reduce maintenance costs, lessen noise. Barry Controls, Inc.

**437** **Vibration Control Specifications**—Bulletin F2B shows how to write vibration control specifications for all types of air conditioning and related equipment regardless of the operating conditions. Contains a definitive treatment of factors involved in selection of various isolation media, with particular attention to the influence of existing job conditions. A selector chart included. The Korfund Co., Inc.

## DUST CONTROL

**438** **Dry-Type Filters**—Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters for the removal of air-borne impurities given. Dollinger Corp.

**439** **Dust Collectors** — Operation, construction, versatility and maintenance of company's unit dust collectors are explained in this bulletin. Includes capacities, sizes. The Kirk & Blum Mfg. Co.

**440** **Hydro-Filter** — Bulletin 556 describes outstanding feature of company's hydro-filter for industrial dust collection. Cutaway view shows construction and design details, and diagrams showing dimensions and a table of capacities included. National Dust Collector Corp.


FOR LESS THAN $1000. YOU CAN ENJOY THE SAVINGS OF POWER SWEEPING!

with a Wilshire Model 800 INDUSTRIAL POWER SWEEPER

FEATURING:

- Performs work of 6 to 21 men with brooms.
- 24" & 36" models for efficient sweeping of narrow aisles & congested areas.
- Patented "DUSCON" dust control system reduces fire hazards, eliminates many rejects on production line, increases plant morale.
- Fingertip controls — detachable sulky — self propelled.

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WILSHIRE Power Sweeper Company
Subsidiary of Elgin Sweeper Company
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Supercote
ALUMINUM ROOF COATING
REFLECTS HEAT
STOPS DETERIORATION

with a Metallic Finish that Brightens with Age

Brush or spray SUPERCOTE ALUMINUM No. 127 on your roof and get a waterproof surface and a heat-reflecting finish in one roof coating application. Made with tough, elastic, water-resistant vegetable pitch combined with finely ground flakes of aluminum. Reduces under-roof temperatures up to 20°.

SUPERCOTE ALUMINUM's pitch-base vehicle locks in the vital roofing oils—keeps them from rising to the surface to oxidize or dull the aluminum. A SUPERCOTE ALUMINUM roof actually gets brighter with age.

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THE GARLAND COMPANY
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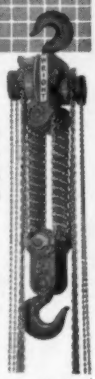
**Your Best Buy for Rigging and Maintenance Work**

**12 Sizes**

**½-ton to 50 tons**

Bulletin 412A gives complete details on the many outstanding features that make Wright Safeways your best buy for long, trouble-free life. Write York, Pa. for your copy.



**Some Safeway Features**

**Load Chain** is finest alloy, every foot proof-tested...heat treated for hard wear-resistant working surface...ductile to withstand shock loads..."wick" lubricated...anti-rust zinc coat.

**Load and Idler Sheaves** rotate on life-lubricated, antifriction bearings...minimum of 5 pockets in Big Sheaves for efficiency and long life.

**Gears, Pinions, Drive Spindle** (also top and bottom Hooks) are nickel-chrome-molybdenum alloy steel mounted on heavy-duty, antifriction bearings. *Gear Train* is enclosed in oil-tight chamber.

**Load Brake** is Weston type, silent, dependable.

**Steel Housing** fully protects vulnerable parts.

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**AMERICAN CHAIN & CABLE**
ACCO

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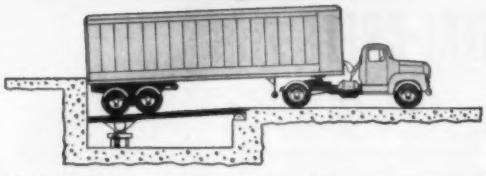
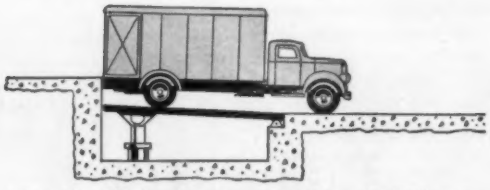
## saves dock space • speeds loading



**High truck beds are lowered to dock level**



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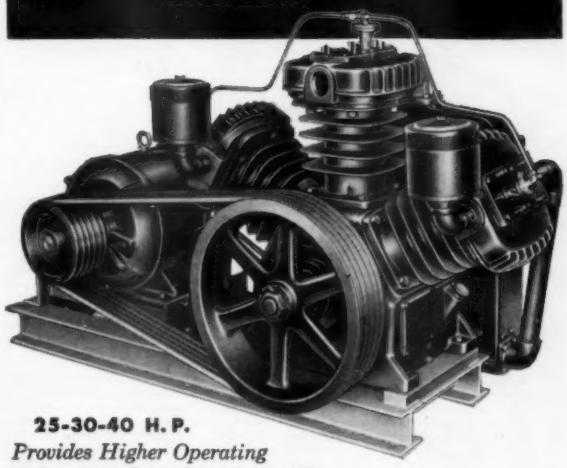

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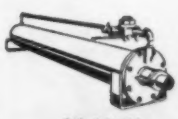

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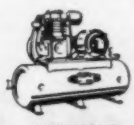

AUTOMOTIVE
AIR COMPRESSORS

PACKAGED AND REMOTE AIR CONDITIONING

CM-21

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# DATA FILE

(Begins on page 218)

**441** **Dust Control Systems**—Valuable engineering data on methods of dust control as well as descriptions of company's line of dust collectors are contained in illustrated Bulletin 636-2. Specifications on all models are included. Aget Mfg. Co.

**442** **Industrial Dust Control**—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included, as well as photos, cutaway views, drawings and capacity data on the various units. Pangborn Corp.

**443** **Flexible Hose**—A set of five bulletins (Nos. 40 through 44) are of interest to plant engineers concerned with the design, installation or purchase of flexible hose for dust and fume control, air conditioning and materials handling. They provide general information, data on installation, application suggestions, technical data and prices on hose, duct and accessories. The Flexaust Co.

## WATER TREATING

**445** **Feedwater Treatment**—Process Bulletin B1, "Treatment of Boiler Feedwater by the Direct, or Indirect Method," discusses advantages of direct treatment, as a complete treating program or as a supplement to external systems. Explains why direct treatment is convenient, economical, and complete, and points out how it improves steam quality, cuts maintenance. National Aluminate Corp.

**446** **Mixed-Bed De-Ionization** — Practical equipment for mixed-bed de-ionization at flow rates of 5 gal per hr to 5000 gpm is described in this 8-pp illustrated bulletin. Advantages of the mixed-bed de-ionizer are detailed, and installation and mechanical construction features discussed. Illinois Water Treatment Co.

## INSTRUMENTS, CONTROLS

**447** **Versatile Electronics** — How flexibility of electronic temperature controls makes them useful in a wide range of heating and air conditioning installations is explained in this 16-pp booklet, Bulletin SA-2681. Purpose of publication is to fill the gap between the theory of electronic bridge circuits and specific control layouts and circuit diagrams. Four basic features that give electronic control its flexibility and broad application are described. Minneapolis-Honeywell Regulator Co.

**448** **For Industrial Metering**—Practical selection and application data on meters for industrial liquids are provided in 20-pp Form 566. Explains value of metering in batch mixing, process and cost control. Illustrated charts show how to select the proper meter according to type, temperature and flow rate of liquid to be metered, and include specifications for models shown. Strainers, valves and other accessories are described. Neptune Meter Co.

**449** **Temperature Controls**—Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating, non-indicating controls; thermometers; bulb installation accessories; process timers, and gas pilots. Includes prices. The Partlow Corp.

**450** **Basic Controls** — More than 34 basic types of industrial temperature and pressure controls are included in this 96-pp industrial catalog. Covers self-operating regulators, water mixing equipment, pneumatic control instruments, indicating and recording instruments, control valves and pneumatic motors. Equipment described is designed for industrial process control, as well as for heating, ventilating, and air conditioning systems, and hot water service applications. Powers Regulator Co.

**451** **Combustion Controls**—Included in this catalog (about 16 pp) are product descriptions of company's combustion instruments and controls. Covers damper controls; drive units; draft, air pressure and flue temperature gages; steam controls; panel board cabinets; low-draft cut-off switches. Pages are fully illustrated to show design and operational details, and brief text includes application suggestions, special features. Cleveland Fuel Equipment Co.

## FILTERING

**452** **Filters, Strainers** — **Industrial Catalog 1054, 48 pp, provides application and engineering information on company's line of micro-filters and precision strainers. Fuel filters, full flow and by-pass lube filters, air separators, and metal edge strainers for fuel lube and industrial use are presented along with construction details, specifications. Purolator Products, Inc.**

**453** **Air Filters**—Eight-pp Bulletin 117 describes advantages of company's Poro-Stone air filters for compressed air lines. Typical applications are illustrated and described, and operating details, capacities and dimensions given. Aftercoolers and cyclone separators are also covered. R. P. Adams Co., Inc.

**454** **Automatic Air Filtering**—Bulletin 780 describes air handling units that incorporate automatic air filtration. Explains adaptability of the filtering by the roll principle to heating and ventilating units, industrial heaters, auditorium unit ventilators, and air conditioning units. Dimension drawings and specification charts are included. American Air Filter Co., Inc.

## OTHER EQUIPMENT

**455** **Industrial Finishing Equipment**—**Catalog A-657, 12 pp, describes a complete modern finishing system for cleaning, rust proofing, drying, painting and finish baking operations. Typical finishing systems handling a variety of products are pictured. The R. C. Mahon Co.**

**456** **Standard Storage Tanks** — The broad scope of services to which company's standard storage tanks are put is covered in this 20-pp catalog. Such qualities as versatility and economy are stressed, and typical installations are pictured. Engineering standards are also included. Graver Tank & Mfg. Co., Inc.


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# DATA FILE

(Begins on page 218)

**457** **Neoprene Design Book**—This illustrated bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Elastomers Div., E. I. du Pont de Nemours & Co.

**458** **Digital Computer**— Bulletin AB-116 illustrates and describes company's G-15D general purpose digital computer and its digital differential analyzer accessory, which considerably increases versatility and range of operations of the computer. New programming techniques and a complete line of input and output equipment are also described. Bendix Computer Div., Bendix Aviation Corp.

**459** **Television Equipment** — Twenty basic applications for "TV Eye" low-cost closed circuit television equipment are described and pictured in Form 3R2335. Folder explains equipment's functions and operation, lists specifications. Radio Corp. of America.

**461** **Water-Cooled Stoker**—Design and operating advantages of the Vibra-grate Stoker are outlined in this illustrated bulletin. A large cutaway view details component parts of the stoker and explains operating features. Other drawings show typical installations. American Engineering Co.

**462** **Steel Reservoirs, Standpipes**—This 24-pp booklet pictures installation of reservoirs of 50,000- to 10,000,000-gal capacity, having cone, umbrella or ellipsoidal roofs and ornamental structures with special architectural features. Chicago Bridge & Iron Co.

**463** **Overheat Protection**—Bulletin MOPR-1, 8 pp, describes design and operation features of inherent overheat protectors—small devices built into electric motors to turn power off when windings get too hot. Includes photos and wiring diagrams illustrating operation. Metals & Controls Corp.

**464** **Air Conditioning System**—Eight-pp Bulletin 121 describes an air conditioning system which supplies fresh air with moisture removed in the summer and added in winter, under control that is maintained in "in between" seasons. Typical installation is illustrated. Niagara Blower Co.

**465** **Piping Insulation**—Seven-pp Bulletin SO 1054 features a snap-on, one-piece molded pipe insulation of fine glass fibers for hot or cold piping. Specifications are given for industrial, commercial, and institutional piping where maximum efficiency is of primary importance and for hot water and low pressure steam. Gustin-Bacon Mfg. Co.

**466** **Glassed Steel Reactors**—Bulletin 927, 8 pp, describes glassed steel reactors for processing a wide variety of products under diverse conditions, stressing their versatility as to corrosion resistance, agitation, and temperature-pressure range. Standard specifications are tabulated and dimensional diagrams are included. The Pfaudler Co.

**467** **Rescue Equipment**—A complete line of hydraulically operated rescue equipment for use in releasing victims trapped in wrecked vehicles, under debris, and in burning buildings is described in 12-pp Catalog HR-300. Pictures show how victims are freed by Porto-Power. Blackhawk Mfg. Co.

**468** **Corrosion Keys for Aluminum** — This brochure is intended primarily as an aid to engineers designing aluminum into process plants or equipment, although it will interest those with other applications of the metal. It makes use of graphs which tell at a glance the yearly corrosion rate of more than 100 chemicals and other corrosive materials on aluminum. The Reynolds Metals Co.

**469** **Corrosion-Proof Materials**— Bulletin CC-3, 16 pp, gives basic information on company's corrosion proof construction materials, covering chemical and physical data, estimating data and descriptions of products used for acid proof installations in the metal working, chemical, petroleum, pulp and paper and other industries. Included are sections on corrosion proof cements, tank linings, protective coatings, rigid plastic fabricating and rigid plastic pipe. The Atlas Mineral Products Co.

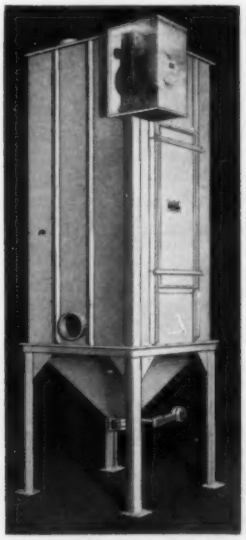
**470** **Insect Control** — Featuring manufacturer's insecticides and insect control equipment, this practical 36-pp booklet provides excellent tips on the control of industrial insects. More than 60 pests are pictured along with specific information on where they are found, identifying features, extent of damage, life stages and cycles, characteristics of existence, and recommended control measures. Ten insecticides detailed. West Disinfectnig Co.

**471** **Teflon Products**—Three bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing and Teflon seal cage—for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

**472** **Solution Resins**—This folder contains a series of bulletins on solution resins, covering six Exon vinyl chloride resins for solution coatings. Outstanding characteristics of each resin are described and a graph showing the solubilities of these resins in methyl ethyl ketone is included. Solution viscosity tables, data on formulating and other information included. Chemical Sales Div., Firestone Plastics Co.

**473** **Metal Cleaning, Finishing** — Principles of metal cleaning are discussed in this 24-pp illustrated catalog. A variety of metal cleaning and finishing machinery is described, including conveyor type cleaning machines, monorail type cleaning machines, drum type cleaning machines, turntable type machines, phosphatizing machines, cabinet type machines, agitating type machines, paint spray booths, special equipment. The Cincinnati Cleaning & Finishing Machinery Co.


**RUEMELIN *Dust Control* EQUIPMENT**



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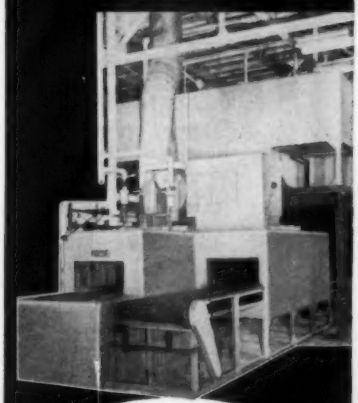

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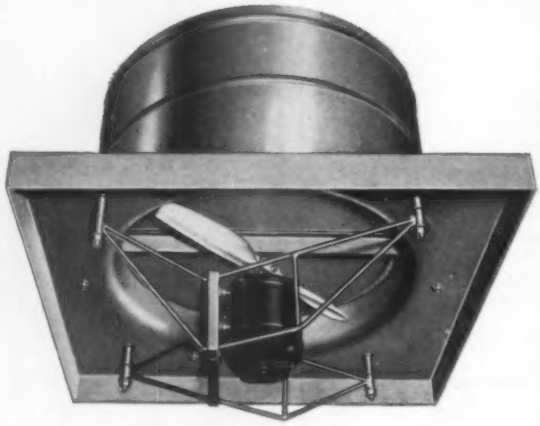
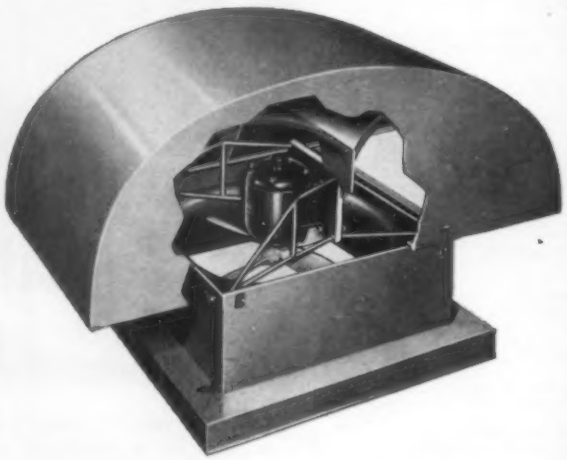


HARTZELL VERTIJET — Windband formed from 20 gauge galvanized steel, base from 14 gauge zinc-grip coated steel. Fan ring is integral part of base sheet. Two semicircular galvanized lids at base of windband open automatically when fan goes on, close weather-tight when it goes off. Throat sizes from 18" to 60"



HARTZELL REVERSIBLE ROOF VENTILATOR—One unit does the job of two conventional one-way ventilators. This unit moves air in either direction with equal efficiency; you convert from intake to exhaust at the flick of a switch. Throat sizes from 28" to 44".

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**HIGH EFFICIENCY . . .**

**These Hartzell roof ventilators expel large volumes of heat, smoke and fumes quickly and efficiently because simplified design reduces obstructions to air flow. There's no maze of interior braces and supports. And all Hartzell roof ventilators are tested for performance in accordance with Standard Test Codes of the American Society of Heating and Air Conditioning Engineers.**

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**Elimination of complications of design and construction produce savings in production costs which are passed along to you. Hartzell design simplicity means that Hartzell roof ventilators can offer top quality construction for long life and dependable service at a price much lower than that of more complex designs.**

**MINIMUM MAINTENANCE . . .**

**By minimizing the number of moving parts Hartzell reduces the number of things that can go wrong. Lids on vertical discharge models are mounted on corrosion resistant brass rods which turn on heavy Micarta plastic bearings which require no lubrication . . . won't stick, won't rust. Fan motors are ball-bearing type, conservatively rated for continuous performance. Under normal operating conditions, the only maintenance required will be periodic motor lubrication.**

*Write today, or ask your nearby Hartzell field engineer for a copy of the free Bulletin A-112A. It contains all the specifications for the two roof ventilators pictured, as well as for Hartzell's Airjet, Rotary and Penthouse roof ventilators.*

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AUGUST, 1957

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